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BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

NEW SERIES

Vol. XVII 1922

Smithsonian Institution
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National Museum

EDITED (IN SUCCESSION) BY

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J. R. de la TORRE-BUENO, *Editor*

G. P. ENGELHARDT J. BEQUAERT

PRESS OF
THE NEW ERA PRINTING COMPANY
LANCASTER, PA.

INDEX TO VOLUME XVII.

(Arranged alphabetically throughout.)

Subjects and Authors.

GENERAL SUBJECT.

Book Notes, J. R. T.-B., 150.
Color Characters *vs.* Structural Characters, J. R. T.-B., 63.
Edward Louis Graef, G. P. E., 43.
Proceedings of the Society, J. Bequaert, 152.
Silas C. Wheat, G. P. E., 125.
The Inalienable Right of Authors to Say What They Please, J. R. T.-B., 124.

COLEOPTERA.

A New Form of *Harpalus,* T. D. A. Cockerell, 25.
A New Species of North American Acmaeoderae, H. C. Fall, 88.
A New Species of *Helodes,* A. B. Wolcott, 94.
Observations on *Typocerus sinuatus* Newman as a Forage Plant Pest, J. S. Wade, 27.
New Species of Carabidae, Staphylinidae and Elateridae, Howard Notman, 99.
Platypsyllus castoris Ritsema in Colorado, T. D. A. Cockerell, 64.
Recent Spread of *Crioceris asparagi* L., F. H. Chittenden, 97.
The Amaranth Flea Beetle, F. H. Chittenden, 147.
The Phyllophaga of Hawthorn (Crataegus), W. J. McColloch and Wm. P. Hayes, 131.

DIPTERA.

A New Borborid from Maryland, J. R. Malloch, 87.
A New Genus of Helomyzidae, J. M. Aldrich, 108.
A Reclassification of the Subfamilies and Genera of the North American Syrphidae, Raymond C. Shannon (continued from Vol. XVI), 30.
A Synopsis of the North American Species of the Dipterous Genus *Amaurosoma* Becker, J. R. Malloch, 77.
An Unused Taxonomic Character in Syrphidae, J. R. Malloch, 42.
The Crane Flies of New York; First Supplementary List, Charles P. Alexander, 58.
Dolichopodidae from the Source of the Hudson River, N. Y., J. Bequaert, 149.
Two New Species of the Genus *Helina,* J. R. Malloch, 95.

HETEROPTERA.

A Change of Name in *Ischnodemus,* H. M. Parshley, 123.
A Note on the Migration of Certain Water Striders, H. M. Parshley, 136.
Both Hydrometras in Kansas, H. B. Hungerford, 78.
Distributional Records of Aquatic Hemiptera, J. R. de la Torre-Bueno, 120.
Droughts and Cannibalistic Responses of the Water-strider *Gerris marginatus* Say, C. F. Curtis Riley, 79.
Geocoris pallens Stål var. *decoratus* Uhl., a Predaceous Enemy of the False Chinch Bug, F. B. Milliken and F. M. Wadley, 143.
Saldoida slossoni Osb. var. *wileyi* n. var., taken in Texas, H. B. Hungerford, 64.
The Genus *Cyrtopeltis* Fieb. in North America, Harry H. Knight, 65.
The Genitalia of the Males of Certain Hemiptera (Heteroptera) and Homoptera, G. C. Crampton, 46.

HOMOPTERA.

A New Species of *Agallia,* with Notes on Other Cicadellidae, C. E. Olsen, 127.

HYMENOPTERA.

An Annotated List of the Ants of Staten Island and Long Island, N. Y., Wm. T. Davis and J. Bequaert, 1.
Note on *Rhodites,* Wm. Beutenmuller, 45.
Notes on Sawflies of the Tribe Euriini, S. A. Rohwer, 91.

LEPIDOPTERA.

A New Genus and Species of Noctuidae, Wm. Barnes, M.D., and A. W. Lindsey, Ph.D., 56.
Concerning *Papilio ajax,* W. C. Dukes, 97.
Description of Two New Species of Aegeriidae, Wm. Barnes, M.D., and A. W. Lindsey, Ph.D., 122.
Isoparce cupressi R. & J., W. C. Dukes, 110.
New Noctuidae, Wm. Barnes, M.D., and A. W. Lindsey, Ph.D., 71.
Notes on the Life Histories of North American Catocalae, with Description of Two New Forms, T. D. Mayfield, 114, 138.
Papilio ajax in New York, James L. Angle, 90.

MECOPTERA.

Panorpa rufescens Feeding on a *Cicada,* J. R. Malloch, 45.

ODONATA.

The Dragonfly *Epicordulia regina,* Wm. T. Davis, 111.

INDEX TO GENERA AND SPECIES OF INSECTS AND PLANTS.

New forms in **bold face;** valid genera and species in Roman; synonyms in *italics;* † indicates Long Island records; * indicates plants.

(For annotated list of Long Island and Staten Island Ants, see pp. 1–25; for list of genera of Syrphidae (Diptera), see pp. 35–37; for lists of Crane Flies of New York, see pp. 58–61: genera and species recorded in these not in this index.)

Achrocordonodes, 34
  dentipes, 34
Acmaeodera **angelica,** 89
  aurora, 88
  auritincta, 88
  cuneata, 89, 90
  dolorosa, 90
  falli, 89
  labyrinthica, 89
  liberta, 89, 90
  nexa, 89
  recticollis, 88
  tenebricosa, 90
Acopa **pura,** 74
Acrotona, 107
Aegeria rileyana, 7
Agallia constricta, 127
  lingulata, 127, 129
  †4-punctata, 127, 129
Agelena naevia, 149
*Agropyron smithii, 28
*Ailanthus, 2
Alcathoe korites, 122
Alydus pilosulus, 55
Amara, 101
  apachensis, 101
*Amaranthus caudatus, 147
  *celosia, 147
  *cruentatus, 147
  *plumosa, 147
  *retroflexus, 148
  *spinosus, 148
  *tricolor, 147
Amaurosoma, 77
  bispinosa, 77
  katmaensis, 77
  nuda, 77, 78
  pallidipes, 77, 78
  unispinosa, 77
*Amblyscirtes vialis, 152
Amblytropidia stoneri, 150
Amphibolix confluentus, 11
Anaduosternum, 106
  brevipennis, 106
Anax junius, 8
Ancyloneura, 91, 92
Andricus seminator, 154
*Andropogon scopiarius, 14, 27, 28
†Apatela, 23
†Apatura clyton, 152
Aphrophora quadrinotata, 55
Archanaria, 75
*Asimina parviflora, 97
*Aster, 28
Atheta, 107
Athetalia, 107
†Atrytonopsis hianna, 152

Baccha; 34
Basilodes pepita, 153
Batrisodes fossicauda, 21
Bembidion complanulum, 100
  decrepitum, 100
  parvulum, 99
Bittacus, 45
  dickersoni, 105
Bledius **mixtus,** 104
  piceus, 105
  semiferrugineus, 105

Blissus leucopterus, 27, 143
† Bombylius incanus, 152
Brachypalpus, 32
    pulcher, 33
Brochymena quadripustulata, 55

Calliprobola, 31, 32
    aldrichi, 33
    crawfordi, 33
    opacus, 33
Catabomba pyrastri, 34
Catocala andromedae, 114, 116
    herodias, 138
    gracilis, 114, 116, 118, 141
        form **cinerea,** 142
            metalomus, 142
    grynea, 140
    praeclara, 139, 142
    sordida, 114, 118, 141
    ultronia, 140
Cedius ziegleri, 21
Celia **decora,** 101
    gibba, 101
    insignis, 101
    nupera, 101
Ceratocapsus, 67
Ceria, 33
Ceriogaster, 33
Cerioides, 33, 34
    (**Monoceromyia**) tricolor, 41, 42
        var. **floridensis,** 41
Cerma **pallida,** 73
Chabuata endiva **vespera,** 71
Chelinidea vittiger, 55
Chilosia, 31, 34
    nigripennis, 34
    parva, 34
    versipellis, 34
† Chrysophanes hypophlaeas, 153
Cicada tibicen, 45
† Cicindela generosa, 21
Cixius coleopum, 55
Clarissa, 91 et seqq.
    anomocera, 93
    atrata, 93
    divergens, 92
    frogatti, 92
    inconspicuus, 92
Clastoptera obtusa, 55
Closterocoris, 67
Colpodota, 107
Cratacanthus, 103
* Crataegus, 131 et seqq.
    * crus-galli, 132, 141
    * mollis, 132
Cremastochilus castaneus, 21
Crioceris asparagi, 97
    12-punctata, 152
Crioprora, 31, 32
Cryptocephalus defectus, 153
    sanfordi, 153
Criorrhina, 31, 33
Cuterebra buccata, 152
† Cychrus elevatus, 152, 153
Cycloptilum minimum, 150
Cynorrhina, 31, 32, 33
Cyphopelta, 67
Cyrtopeltis *geniculata,* 65 et seqq.
    melanocephalus, 66
    simplex, 67
    tenuis, 67
    varians, 65 et seqq.
Cyrtopeltocoris, 67

Dacerla, 67
Dicranomyia **adirondacensis,** 62
    brevivena, 62
Dicyphus *luridus,* 65 et seqq.
Disholcapsis mamma, 19
Disonycha glabrata, 147
Dolichopus abruptus, 149
    discifer, 149
    dorycerus, 149
    flavilacertus, 149
    harbecki, 149
    stenhammeri, 149
    variabilis, 149

† Donacia hirticollis, 152
  proxima episcopalis, 152
Doros, 33
Dracopis amplexicaulis, 28
† Driotura gammaroides var. flava, 130

Engytatus, see Cyrtopeltis
Epia, 56
Epicordulia princeps, 111
  regina, 111
Euaontia, 76
Eumerus, 31
  strigata, 33
Eumyiolepta, 34
* Eupatorium, 11
Europhilus antiquus, 102
  lenis, 102
  ruficornis, 102
Europsis, 91
Eurycotis similis, 150
Eurys, 91, 92, 93
Euscelis (Athysanus) stactogalus, 130
† Eutettix pictus, 130
  † slossoni, 130

Ferdinandea, 31

Gastrofusa *aenea,* 153
Gastroidea *aenea,* 153
* Gaylussacia, 13, 14
Geocoris pallens, 143 et seqq.
  decoratus, 144
Gerris buenoi, 120, 137
  canaliculatus, 120
  conformis, 55, 120
  marginatus, 79 et seqq., 120, 137
  orba, 79 et seqq.
  remigis, 79 et seqq., 137
  rufoscutellatus, 120, 137
Graphocephala coccinea, 55
Gypona octolineata, 55

Hadena, 56
Harpalus gregarius
    subsp. **cimensis,** 25
Helina **algonquina,** 96
  cothurnata, 96
  hirtibasis, 96
  multiseriata, 95
  oregonensis, 96
  spuria, 96
Helodes apicalis, 94
  maculicollis, 94
  nunenmacheri, 94
Helophilus modestus, 34
Hetaerius brunneipennis, 21
Heterocous (?) dubius, 150
Heteroderes **nicholsi,** 107
  sordidus, 108
Hydrometra australis, 78
  martini, 78
Hydrophorus chrysologus, 149
Hyperepia, 56
  pi, 56

Ischnodemus **hesperius,** 123
  brevicornis, 123
Ischnoptera, 55
Isoparce cupressi, 110

Jassus olitorius, 55

Lepisma, 47
Leptocera *intrudens,* 87
  meridionalis, 87
Leucania, 75
† Limenitis ursula var. albofasciata, 153
Limnoporus (see Gerris)
* Linum lewisii, 28
Lopidea, 55
Lutomyia, 108
  spurca, 109
† Lybithea bachmanni, 153

Machilis, 47
Mammifrontia, 75
  leucania, 75

* Martynia louisiana, 65
Megastilicus formicarius, 21
Melampsalta calliope, 55
Melanostoma, 34
Melittia grandis, 123
  superba, 122
Merapioides, 31, 32, 33
Meromacrus, 30
Mesovelia bisignata, 120
  mulsanti, 137
Metrobates hesperius, 121
† Microdon bombiformis, 152
  megalogaster, 152
Micropus *curticornis,* 123
  brevicornis, 123
  albonotata, 137
Microvelia americana, 121
Microxylota robii, 34
Milesia, 30
† Mitoura damon, 152
Monoceromyia, 33, 41
Myiolepta strigillata, 34

Nausigaster bonariensis, 40
  chrysidiformis, 39, 41
  peruviensis, 40, 41
  unimaculata, 40
Neoeurys, 91, 92
  caudata, 94
  tasmanica, 94
Neoproba varians, see Cyrtopeltis
Neuria, 56
Nodonota puncticollis, 153
Nothophila, 75
  angulata, 76
† Notodonta georgica, 152
Notonecta irrorata, 121
Nysius ericae, 143

Ocypotamus, 34
Oncocnemis **deceptiva,** 72, 73
  linda, 72, 73
  punctilinea, 71
Orectoderus, 67
Ormenis pruinosa, 55
Otiocerus degeeri, 55
Oxypoda, 106

Panorpa nebulosa, 55
  rufescens, 45
† Papaipema furcata, 153
Papilio ajax, 90, 97
Paranthrene **fenestratus,** 122
Pentacora ligata, 55
† Perigea xanthioides, 153
Phyllophaga spp., 131 et seqq.
Platymetopius acutus, 55
Platynochaetus, 34
Platypsyllus castoris, 64
Poblicia fuliginosa, 55
Pocota, 32
Polydonta, 34
Polydontomyia, 34
Polyclonus, 91
  floridensis, 97
* Populus grandidentata, 2, 15
Porphyrops, 149
* Prunus serotina, 2
Pseudomedon **cephalotes,** 105
  obsoletum, 106
Psilota anthracina, 38
  buccata, 38
  thatuna, 38, 39
Pterallastes, 31, 32, 34
Ptomaphagus parasitus, 21

* Quercus nana, 15
  * bicolor, 19

Ranatra americana, 121
  fusca, 121
  grisea, 121
  kirkaldyi, 121
  protensa, 121
* Ratibida columnaris, 28
Rhagovelia obesa, 121
Rheumatobates rileyi, 137
Rhodites *bicolor,* 45
  occidentalis, 45
Rhysops, 34
Ricania speculum, 55
* Rudbeckia flava, 28

Saldoida slossoni var. **wileyi,** 64
  cornuta, 64
Salpingogaster, 34
Scaeva, 34
Sciocoris microphthalmus, 151
Senogaster, 34
  comstocki, 34
Sericophanes, 67
Solenophorus **sinuaticollis,** 102
Somula, 31, 33
* Sorghastrum nutans, 28
Sphecomyia, 33
Sphyximorpha, 33, 34
Spilomyia, 30, 31, 33
* Sporobolis airoides, 28
Stenomorphus **convexior,** 103
Sthenopis auratus, 153
Stictocephala lutea, 55
Syritta, 31
Syrphus, 34
Systellonotus, 67

Tachyta nana, 101
  parvicornis, 100
Tachyura incurva, 20
* Taxodium distichum, 110
Teleorhinus, 67
Temnostoma, 33
Tessaratoma, 55
Teuchocnemis, 31, 32
Thelia bimaculata, 18, 20, 23
† Therina pellucidaria, 21
Thyatirina, 76
Tiphia, 153
† Tolype laricis, 153
Trepobates pictus, 121
Triodonta, 34
† Trogus fulvipes, 152
  † vulpinus, 151
Tropidia, 31, 32
  cooleyi, 34
Typocerus sinuatus, 27

* Vaccinium, 116, 118, 120
* Vernonia noveboracensis, 153

Xanthandrus, 34
Xanthogramma aequalis, 33
Xenodusa cava, 23
Xenomydaea buccata, 96
Xylota, 32

Zelus cervicalis, 55

New Genera and Subgenera in this Index, 7.
New Species and Subspecies, 42.
New Varieties, 4.

Vol. XVII FEBRUARY, 1922 No. 1

BULLETIN

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BROOKLYN ENTOMOLOGICAL SOCIETY

NEW SERIES

PUBLICATION COMMITTEE

J. R. de la TORRE-BUENO,
Editor

DR. J. BEQUAERT GEO. P. ENGELHARDT

Published by the Society

Price, 35 cents Subscription, $1.50 per year

Mailed June 15, 1922

Entered as second-class matter January 21, 1919, at the postoffice at Lancaster Pa.,
under the Act of March 3, 1879

The Brooklyn Entomological Society

Meetings are held on the second Thursday after the first Tuesday of each month from October to June, inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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CONTENTS

ANTS OF LONG ISLAND, Davis and Bequaert........................ 1

A NEW FORM OF HARPALUS, Cockerell........................ 25

LIFE HISTORY OF TYPOCERUS SINUATUS, Wade............... 26

RECLASSIFICATION OF N. AM. SYRPHIDAE (conclusion), Shannon 30

UNUSED CHARACTER IN SYRPHIDAE, Malloch................ 42

Bulletin of the Brooklyn Entomological Society

Published in
February, April, June, October and December of each year

Subscription price, domestic, $1.50 per year; foreign, $1.60 in advance; single copies 35 cents. Advertising rates on application. Short articles, notes and observations of interest to entomologists are solicited. Authors will receive 25 reprints free if ordered in advance of publication. Address subscriptions and all communications to

J. R. de la TORRE-BUENO, Editor,
11 North Broadway, White Plains, N. Y.

BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

VOL. XVII FEBRUARY, 1922 NO. 1.

AN ANNOTATED LIST OF THE ANTS OF STATEN ISLAND AND LONG ISLAND, N. Y.

BY WM. T. DAVIS AND J. BEQUAERT.

When Prof. Wm. M. Wheeler became an active member of the New York Entomological Society, in October, 1905, some of those who attended the meetings were naturally led to paying attention to the ever-interesting ant and her ways. Not only did it become possible to get specimens named, but field excursions were undertaken by Prof. Wheeler and some of the members of the Society to Long Island, Staten Island, and New Jersey. The Pine Barrens of the last-named State were particularly productive of interesting finds and several new species of ants were collected there. In the Pine Barrens there were also large colonies of the beautiful, shining black *Dolichoderus taschenbergi* var. *aterrimus,* the red and black, but equally shining *Dolichoderus mariae,* and the slow-moving, spiny-backed, fungus-growing *Trachymyrmex septentrionalis.* This last received much attention. On the small pine trees there were occasionally a number of "cow-sheds," built by *Crematogaster pilosa.* It is of interest that this ant has not yet been collected on either Staten Island or Long Island. It is also of interest that no colonies of either *Dolichoderus t.* var. *aterrimus* or *D. mariae* have been found on Staten Island, though both species are resident in the pine barren areas of Long Island. It would seem that at least *D. mariae* subsp. *davisi* Wheeler, not uncommon at Jamesburg and elsewhere in the Delaware Valley region, should also be found on Staten Island, which is included in this region on the faunal map accompanying the late Prof. Smith's Report on New Jersey Insects (1910). While the colonies of the fungus-growing ant have been found far out on Long Island, thus greatly extending the previously known range of the species, it also is yet to be discovered on Staten Island. Some of these species may at one time have occurred on Staten Island, when the flora of its sandy ground areas had not been so frequently fire-swept, and was more like that to be found at present on parts of Long Island.

Some ants, as is well known, follow certain soil conditions and the accompanying flora, as, for instance, particular plants that support the aphids, coccids, and tree-hoppers they attend. Oak galls of some species, also the secretory glands on the leaves of the *Ailanthus,* wild cherry (*Prunus serotina*), and poplars, sometimes contribute to the support of ants. In the Half Way Hollow Hills, near Wyandanch, L. I., on July 4, 1910, the following ants were found attending the glands near the base of the leaf-blades of *Populus grandidentata: Myrmica scabrinodis schencki* var. *emeryana, Leptothorax longispinosus, L. curvispinosus, Tapinoma sessile, Lasius niger* var. *americanus, Formica fusca* var. *subsericea, Camponotus herculeanus pennsylvanicus* and its var. *ferrugineus.* On another occasion, at Yaphank, June 9 to 11, 1912, the leaf glands on some young *Populus grandidentata* were visited by *Monomorium minutum, Myrmica scabrinodis schencki* var. *emeryana, Dolichoderus plagiatus, Prenolepis imparis, Formica fusca* var. *subsericea, F. neogagates,* and *Camponotus herculeanus pennsylvanicus* var. *ferrugineus.* It must, however, be noted that ants are not the only insects attracted by the foliar nectaries of this poplar, for one finds on them numbers of flies, beetles, bees, etc.

In his annotated List of the Ants of New Jersey (1905), Prof. Wheeler lists 93 species, subspecies, and varieties, but for a number of these no definite localities could be recorded, though they may occur in the State. The revised List of New Jersey Insects published by the late Prof. J. B. Smith in 1910 records 86 forms of ants, but some of his names are undoubtedly based on erroneous identifications. Thus his *Stenamma piceum* evidently duplicates *Aphaenogaster fulva aquia* var. *picea* of the same list; *Lasius umbratus mixtus* var. *affinis* Schenck is a European form not known from North America; and *Formica sanguinea rubicunda* var. *integroides* Wheeler is an ant of the western United States.

On the other hand, a number of additions to the New Jersey ants have been made in recent years, so that 88 distinct forms of Formicidae are at present definitely known to occur in the State. For the sake of comparison with the Long Island and Staten Island List, we subjoin the following revised enumeration of New Jersey ants:

Stigmatomma pallipes (Haldeman).
Ponera coarctata pennsylvanica (Buckley).
Sysphincta pergandei Emery.
Proceratium crassicorne Emery.
Myrmecina graminicola americana Emery.
Monomorium pharaonis (Linnaeus).
Monomorium minimum (Buckley).
Solenopsis molesta (Say).
Crematogaster lineolata (Say).
Crematogaster lineolata var. *lutescens* Emery.
Crematogaster lineolata var. *cerasi* (Fitch).
Crematogaster pilosa Pergande.
Pheidole davisi Wheeler.
Pheidole morrisi Forel.
Pheidole vinelandica Forel.
Pheidole vinelandica var. *longula* Emery.
Pheidole pilifera (Roger).
Stenamma brevicorne (Mayr).
Aphaenogaster treatae Forel.
Aphaenogaster mariae Forel.
Aphaenogaster lamellidens Mayr.
Aphaenogaster fulva Roger.
Aphaenogaster fulva aquia (Buckley).
Aphaenogaster fulva aquia var. *picea* Emery.
Myrmica punctiventris Roger.
Myrmica punctiventris pinetorum Wheeler.
Myrmica scabrinodis var. *sabuleti* Meinert.
Myrmica scabrinodis var. *fracticornis* Emery.
Myrmica scabrinodis schencki var. *emeryana* Forel.
Myrmica brevinodis var. *canadensis* Wheeler.
Leptothorax curvispinosus Mayr.
Leptothorax longispinosus Roger.
Leptothorax fortinodis Mayr.
Leptothorax schaumi Roger.
Leptothorax texanus davisi Wheeler.
Tetramorium caespitum (Linnaeus).
Trachymyrmex septentrionalis (McCook).

Tapinoma sessile (Say).
Tapinoma pruinosum Roger.
Dorymyrmex pyramicus (Roger).
Dolichoderus mariae Forel.
Dolichoderus mariae davisi Wheeler.
Dolichoderus taschenbergi var. *aterrimus* Wheeler.
Dolichoderus plagiatus (Mayr).
Dolichoderus plagiatus var. *inornatus* Wheeler.
Dolichoderus plagiatus pustulatus Mayr.
Dolichoderus plagiatus pustulatus var. *beutenmuelleri* Wheeler.
Brachymyrmex heeri depilis Emery.
Prenolepis imparis (Say).
Prenolepis imparis var. *testacea* Emery.
Prenolepis parvula Mayr.
Prenolepis arenivaga Wheeler.
Lasius niger var. *americanus* Emery.
Lasius niger var. *neoniger* Emery.
Lasius brevicornis Emery.
Lasius flavus nearcticus Wheeler.
Lasius umbratus mixtus var. *aphidicola* (Walsh).
Lasius umbratus minutus Emery.
Lasius umbratus speculiventris Emery.
Lasius interjectus Mayr.
Lasius claviger (Roger).
Lasius claviger subglaber Emery.
Lasius latipes (Walsh).
Lasius murphyi Forel.
Formica sanguinea rubicunda Emery.
Formica sanguinea subintegra Emery.
Formica truncicola integra Nylander.
Formica truncicola obscuriventris Mayr.
Formica difficilis Emery.
Formica exsectoides Forel.
Formica exsectoides var. *davisi* Wheeler.
Formica fusca var. *subsericea* Say.
Formica neogagates Emery.
Formica pallide-fulva Latreille.
Formica pallide-fulva schaufussi Mayr.
Formica pallide-fulva schaufussi var. *incerta* Emery.
Formica pallide-fulva nitidiventris Emery.
Formica pallide-fulva nitidiventris var. *fuscata* Emery.
Polyergus lucidus Mayr.
Camponotus castaneus (Latreille).
Camponotus castaneus americanus Mayr.
Camponotus herculeanus pennsylvanicus (De Geer).

Camponotus herculeanus pennsylvanicus var. *ferrugineus* (Fabricius).
Camponotus herculeanus ligniperdus var. *noveboracensis* (Fitch).
Camponotus caryae (Fitch).
Camponotus caryae var. *minutus* Emery.
Camponotus caryae var. *pardus* Wheeler.
Camponotus caryae subbarbatus Emery.

Of the three ants that have been found on Long Island, but have not yet been recorded from New Jersey, one, *Tetramorium guineense,* is an introduced form, only found in greenhouses and not properly belonging to the local fauna; while the two others, *Strumigenys pergandei* and *Formica truncicola obscuriventris* var. *gymnomma,* will eventually be found in that State. Twenty-three forms of the New Jersey list have not been taken on Long Island. A number of these, such as *Sysphincta pergandei, Monomorium pharaonis, Pheidole vinelandica, Leptothorax schaumi, Camponotus herculeanus ligniperdus* var. *noveboracensis,* probably occur there. Others, however, such as *Crematogaster pilosa, Aphaenogaster mariae, A. lamellidens, Leptothorax texanus davisi,* and *Prenolepis arenivaga,* may not be found farther north than the New Jersey pine barren area.

The present list records 68 species, subspecies, and varieties of ants for Long Island and 55 for Staten Island. While these numbers will undoubtedly be somewhat altered by future investigations, they nevertheless compare very favorably with what is known of the ant fauna of the eastern United States in general, considering the small areas involved (Long Island, with 1,682 square miles; Staten Island, with 58 square miles). New Jersey, with a considerably larger and much more varied territory (7,815 square miles), possesses only few additional forms.

The writers wish to acknowledge their indebtedness to Professor Wm. Morton Wheeler, who has helped them not only with the identification of doubtful specimens, but also in various other ways, especially in criticizing the revised list of New Jersey Formicidae.

PONERINAE.

1. *Stigmatomma pallipes* (Haldeman).

STATEN ISLAND: Arlington, June 9, 1907, under stump in the ground (Ds. Coll.). LONG ISLAND: West Hills; Wading River (Ds. Coll.); North Beach, in damp woods under logs (F. M. Schott Coll.); Yaphank (C. W. Leng Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

These specimens all belong to the var. *wheeleri* Santschi, which, in Prof. Wheeler's opinion, can hardly be distinguished from the typical form.

Though this is not a very rare ant, it is difficult to find, because its colonies are small; they are established in or under stumps, in rich woods. It is most frequently met with sifting. Its larger size and its very long, serrate mandibles separate it readily from the common *Ponera coarctata.*

In September, 1903, a nest of this species was found under a stone, north of Inwood on Manhattan Island, and on September 9, 1905, ants of the same species were found under the same stone. The colonies probably continue for a considerable period in the same place if undisturbed.

2. *Ponera coarctata* (Latreille) var. *pennsylvanica* (Buckley).

STATEN ISLAND: A great number of specimens have been taken at Arrochar, Watchogue, Clove Valley, St. George, and many other places (Ds. Coll.). On September 21, 1919, a nest was found containing workers, several wingless females, and winged males. LONG ISLAND: Wyandanch; East New York; West Hills (Ds. Coll.); Newton Heights (F. M. Schott Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

This is a common species in woods where it lives in small colonies under stones, under the bark of decaying trees, under dry leaves, and such like places.

3. *Sysphincta pergandei* Emery.

STATEN ISLAND: Arrochar, near Old Town Road, June 8, 1907, under a stone (Ds. Coll.). A very rare ant.

4. *Proceratium crassicorne* Emery.

STATEN ISLAND: Taken on several occasions, as, for instance, four workers near Old Town Road, May 13, 1906, and one worker from a log containing the nest of a carpenter ant, November 10, 1907 (Ds. Coll.). LONG ISLAND: Cold Spring Harbor, August 2, workers and cocoons in a rotten stump (Wm. M. Wheeler Coll.). These are the specimens recorded under the name *P. silaceum* Roger, in Bull. American Mus. Nat. Hist., XXI, 1905, p. 375; the correction has been communicated to us by Prof. Wheeler.

MYRMICINAE.

5. *Myrmecina graminicola* (Fabricius) subsp. *americana* Emery.

STATEN ISLAND: Arrochar, June 1, 1907 (Ds. Coll.). LONG ISLAND: north of Amagansett (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.). This small ant nests in logs and stumps, in rich woods.

6. *Monomorium minimum* (Buckley).

STATEN ISLAND: Clove Valley and elsewhere (Ds. Coll.). LONG ISLAND: Rockaway (J. B. Coll.); Wading River; Baldwin; Pinelawn; Wyandanch; Gardiner's Island (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

Nest in the ground, in sandy places. This form is usually recorded as a variety of *Monomorium minutum* Mayr, but Prof. Wheeler informs us that he is now inclined to regard it as a distinct species.

Monomorium pharaonis (Linnaeus) is likely to be found in houses in Brooklyn. It is a very troublesome house ant, introduced from the warmer regions of the Old World. In New York City it has been found on several occasions, as, for instance, August, 1908, in a house at West 83d St., and this year (1921) at West 79th St.

7. *Solenopsis molesta* (Say).

STATEN ISLAND: Tottenville, near Mill Creek, nesting in the sand tube made by *Aegeria rileyana,* August, 1920; Long Neck (Ds. Coll.). LONG ISLAND: Baldwin; Wyandanch; Yaphank; Brooklyn; East New York (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.); Forest Park, Brooklyn (L. F. Barnum, Jr., Coll.).

The specimens from Wyandanch were found nesting under a stone, May 1, 1910. This tiny ant is often common in open grassy places, but it is also known to invade houses and nest in the masonry and woodwork.

8. *Crematogaster lineolata* (Say).

Staten Island: Long Neck; Arlington; Watchogue; and many other places (Ds. Coll.). Long Island: Oakdale (F. M. Schott Coll.); Calverton; Yaphank; Half Way Hollow Hills; Deep Pond and Long Pond, Wading River; Wyandanch; Pinelawn; Amagansett; Flushing; Shelter Island; Southhold; West Hills (Ds. Coll.).

This is one of our commonest ants in woods. It most frequently nests under stones or under bark of fallen trees; sometimes inside logs. Like the related *C. pilosa* Pergande, of southern New Jersey, this species also constructs "cow-sheds," though more rarely so. At Yaphank, in July, 1908, a "shed" was found on a young locust tree entwined by a Virginia creeper. It was composed of bits of leaves, bark, parts of flowers, a few grains of sand, etc., and was about the size of a small hickory nut. Further examples of constructions of this kind by *C. lineolata* are described and figured in Wheeler's paper on the habits of the tent-building ant (Bull. American Mus. Nat. Hist., XXII, 1906, pp. 1–18, Pls. I–VI).

On September 21, 1907, at Long Neck, Staten Island, the winged sexes of this *Crematogaster* were leaving a nest for their nuptial flight. They crawled to the top of a fence post and out on the branches of a poison ivy vine. There the workers would pursue them, and seemed to be inducing them to take wing. They would make several efforts with their wings and finally be gone. Two dragonflies, *Anax junius,* were flying above the nest, busily engaged devouring the winged males and females which they captured in flight. Swallows also destroy many ants when these insects are swarming.

9. *Pheidole davisi* Wheeler.

Long Island: Wading River, June 24, 1915 (Ds. Coll.).

10. *Pheidole morrisi* Forel.

Long Island: Long Pond, Wading River; Yaphank; Selden (Ds. Coll.).

This and the preceding species nest in the pure, white sand of the pine barren region, making small craters.

11. *Pheidole pilifera* (Roger).

Staten Island: Tottenville; Arrochar; and elsewhere (Ds. Coll.). Long Island: Aqueduct; Pinelawn; Baldwin; Wyandanch (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

This species nests in sandy and gravelly soil and is the only true harvesting ant of our vicinity, storing the chambers of its nest with seeds of grasses and of other plants.

12. *Pheidole vinelandica* Forel.

Staten Island: Watchogue; Richmond Valley; Rossville; Tottenville (Ds. Coll.).

This and the following variety probably occur on Long Island also, where they should be looked for in the pine barren region. They nest in clay mixed with sand, throwing out small craters.

13. *Pheidole vinelandica* var. *longula* Emery.

Staten Island: Tottenville, making numerous small crater nests in sand (Ds. Coll.).

14. *Stenamma brevicorne* (Mayr).

Staten Island: In a salt meadow, November 6, 1907; also on May 13 (Ds. Coll.). Long Island: Cold Spring Harbor, May 19, 1909, two females, one of them winged (Ds. Coll.).

This is a rare species, nesting under stones and dead leaves in shady woods. The specimens of our vicinity are somewhat different from the typical form and should, in Prof. Wheeler's opinion, bear a varietal name.

15. *Aphaenogaster treatae* Forel.

Staten Island: Long Neck and elsewhere (Ds. Coll.). Long Island: Pinelawn, September 28, 1907; Long Pond and Deep Pond, Wading River; Riverhead; Central Park; Calverton; Yaphank; Gardiner's Island (Ds. Coll.).

The nests are burrowed in the sand of open woods.

16. *Aphaenogaster fulva* Roger subsp. *aquia* (Buckley).

Long Island: Little Neck; Huntington (F. M. Schott Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

A number of specimens of this subspecies from the following localities belong to an undescribed variety:

Staten Island: New Dorp; Clove Valley (Ds. Coll.). Long Island: Valley Stream; Wyandanch (F. M. Schott Coll.); Half Way Hollow Hills, nest in old log; Amagansett; Baldwin; Yaphank; Gardiner's Island; Selden (Ds. Coll.).

This is one of our commonest ants; like the following variety, it nests in logs and under stones in woods.

17. *Aphaenogaster fulva* subsp. *aquia* var. *picea* Emery.

Staten Island: Arrochar, June 8, 1907, nest under stone (Ds. Coll.). Long Island: south of Smithtown (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

18. *Myrmica punctiventris* Roger.

Staten Island: Isolated specimens at Long Neck and other places (Ds. Coll.). Long Island: Wyandanch; Yaphank; Amagansett; Gardiner's Island (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

This species is rare and usually obtained sifting dead leaves in woods.

19. *Myrmica punctiventris* subsp. *pinetorum* Wheeler.

Long Island: Yaphank; Long Pond, Wading River (Ds. Coll.).

This is the form of the pure sand of the pine barren region.

20. *Myrmica scabrinodis* Nylander var. *sabuleti* Meinert.

Staten Island: Found on several occasions; it was seen swarming on September 26, 1891; on June 1, 1892, a nest was found constructed in a clump of grass growing in moist ground, and another similar nest was seen August 28, 1897 (Ds. Coll.). Long Island: Maspeth (C. E. Olsen Coll.); Orient (J. B. Coll.); Fire Island; Amagansett; Wyandanch; Yaphank (Ds. Coll.).

21. *Myrmica scabrinodis* subsp. *schencki* Emery var. *emeryana* Forel.

Staten Island: Tottenville; Arrochar; Long Neck; and many other places (Ds. Coll.). Long Island: Pinelawn; Wading River; Gardiner's Island; Rockaway Beach; Montauk; Yaphank; Central Park; Massapequa; Wyandanch; Half Way Hollow Hills;

Amagansett; Orient; south of Smithtown; Southhold; Fire Island; Brooklyn (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

This form is the one recorded as *M. rubra scabrinodis* var. *schencki* in Wheeler's List of the Ants of New Jersey (1905). It is very common in our neighborhood and nests in the ground, preferably in sandy or gravelly and sunny places, such as roadsides, dry pastures, and the like. The tooth or lobe at the base of the antennal scape offers much diversity in specimens taken from different nests and the records here given for *emeryana* probably relate to several forms which, however, have not yet been distinguished in this country.

22. *Myrmica brevinodis* Emery var. *canadensis* Wheeler.

LONG ISLAND: Pinelawn (Ds. Coll.).

This is a more boreal ant which nests in bogs and low-lying meadows.

23. *Leptothorax curvispinosus* Mayr.

STATEN ISLAND: Richmond; Watchogue; Arrochar; and many other places (Ds. Coll.). LONG ISLAND: Half Way Hollow Hills; Wyandanch; Yaphank; Amagansett; Pinelawn (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

This ant usually nests in hollow twigs of the elder in shady woods, but we have found it sometimes in decayed wood. On April 18, 1909, a nest was discovered in a stem of purple boneset (*Eupatorium*) at Richmond, S. I. Very frequently, too, the female chooses old galls for its nesting site, so, for instance, on August 12, 1883, a nest was found in an empty fly gall on golden rod, and at Lakehurst, N. J., a nest was observed in the large oak-apple of *Amphibolips confluentus* Harris. Swarming was witnessed July 8, 1907.

24. *Leptothorax longispinosus* Roger.

STATEN ISLAND: Willow Brook; May 6, 1906, a nest of this species was found in the bark of a tree; Tottenville; Arrochar (Ds. Coll.). LONG ISLAND: Amagansett; Half Way Hollow Hills; Gardiner's Island (Ds. Coll.).

According to Wheeler, this ant nests under small stones lying on large boulders, in the clefts of rocks, and more rarely under bark.

25. *Leptothorax fortinodis* Mayr.

Staten Island: Found on several occasions at Richmond, running on the trunk of a dead oak, in May and June, 1908, and again May 30, 1909. Long Island: Calverton (Ds. Coll.).

This is a rare ant in our vicinity. It nests in the bark of dead trees.

26. *Leptothorax schaumi* Roger.

Staten Island: A few specimens were found at Richmond together with the foregoing species (Ds. Coll.).

L. fortinodis and *L. schaumi* were taken from the same situations, running on the bark of trees. Their distinction seems to be very unsatisfactory.

27. *Tetramorium caespitum* (Linnaeus).

Staten Island: Arrochar; New Brighton; and elsewhere (Ds. Coll.). Long Island: Baldwin; Forest Park (Ds. Coll.); Rockaway Beach (J. B. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

This ant has been introduced from Europe, but is now well established in the eastern United States. In our neighborhood it is common in gardens and country houses; it has also been found in apartment houses in New York City. Swarming was witnessed on June 18.

28. *Tetramorium guineense* (Fabricius).

Long Island: Introduced; in the greenhouse of the Botanical Garden, at Brooklyn, January, 1921 (Ds. Coll.).

29. *Strumigenys pergandei* Emery.

Long Island: Forest Park, Brooklyn, September, 1908; several specimens of this very rare ant were found under a small stone by Mr. L. F. Barnum, Jr.

30. *Trachymyrmex septentrionalis* (McCook).

Long Island: The fungus-growing ant has now been found in several localities: Wading River, June 1, 1913, June 25, 1913, and May 31, 1914; near Deep Pond and south of Long Pond, Wading River, September 1, 1919; Hauppaug, June 1, 1914; near Mill Pond, south of Smithtown, June 1, 1914; Selden, August 30, 1916 (Ds. Coll.).

All these points are either in the pine barren area or in sandy regions. Previous to its discovery on Long Island, as recorded in the Journal of the New York Entomological Society, March, 1914 (Vol. XXII, p. 64), it had not been found farther north than the vicinity of the Raritan River, New Jersey.

This is the only fungus-growing or cutting ant that extends into the Northern States and it is found only in pine barren or similar sandy regions, nesting in pure sand. "It moves very slowly and is so timid that it retreats into its nest at the slightest alarm. The nest is not easily found except during the spring and autumn when the ants are actively excavating. At such times one may find a circular nest entrance about three sixteenths of an inch in diameter and an inch or two to one side of it a pile of sand brought out by the workers. The entrance leads into an oblique gallery, which widens at intervals into two or three spheroidal chambers, varying from 1 to 2 inches in diameter. Sometimes these chambers form the blind terminations of two or three different galleries branching off from the main or entrance gallery. The rootlets of plants are left spanning the chambers and from these fibrous supports the fungus gardens are suspended. They consist of a substratum of bits of leaves, buds, green seeds, and caterpillar excrement collected by the ants and woven together by the white hyphae of a mould-like fungus, which is carefully cultivated by the insects and constitutes their only food. Since the culture of the fungus depends on definite degrees of moisture and temperature, the ants are very careful of the ventilation of their nest. During the dry spells of midsummer the entrance is closed with bits of leaves and twigs to prevent the escape of the requisite humidity. At such times it is almost impossible to find the nests. In spring, however, when, after the first warm rains, the ants are clearing and renovating their chambers, and again in the fall after they have raised their brood and are preparing for the winter, the external architecture of the nest is more noticeable" (Wheeler).

In May, 1906, this ant was observed at Lakehurst, N. J., carrying the petals of *Gaylussacia* into its nest, as well as a few other bits of flowers, etc. In one instance a flower and part of its stem from a *Gaylussacia* had proven too big to be taken into the nest and had been left near the entrance. In one of the nests that was opened the chambers were stored with many petals, etc., but chiefly with the flowers of *Gaylussacia.* On August 19, 1909, several winged females were taken on bushes and on the ground at Bonhamtown, N. J., the northernmost locality where this ant has been found in New Jersey.

A more detailed account of the habits of this interesting species is given by Prof. Wheeler in the Bulletin of the American Museum of Natural History, Vol. XXIII, 1907, pp. 746–753.

DOLICHODERINAE.

31. *Tapinoma sessile* (Say).

STATEN ISLAND: Old Place; Todt Hill; Watchogue; Tottenville; etc. (Ds. Coll.). LONG ISLAND: Rockaway Beach; Riverhead; Yaphank; Wading River; Orient; Fire Island; Wyandanch; Pinelawn (Ds. Coll.).

One of the most common local ants. It nests between dry leaves, under stones or pieces of wood, under bark, etc. On June 27 a nest was found raised in the grass of a wet meadow, at the edge of the salt meadows, near Midland Beach, S. I.

32. *Tapinoma pruinosum* Roger.

LONG ISLAND: Yaphank; Wyandanch; Montauk (Ds. Coll.).

33. *Dorymyrmex pyramicus* (Roger).

LONG ISLAND: Wading River (Ds. Coll.).

34. *Dolichoderus mariae* Forel.

LONG ISLAND: Pinelawn; Riverhead; Long Beach; Wyandanch; Calverton; Yaphank; Selden; Massapequa (Ds. Coll.).

During a visit to Pinelawn, L. I., September 28, 1907, in company with Prof. Wheeler and Mr. Beutenmuller, a nest of this species was found about a clump of grass. At Lakehurst, N. J., *D. mariae* more often locates its nest in grass tussocks, especially those of *Andropogon scoparius,* from which the ants remove much of the sand; the grass is frequently stunted as a consequence.

35. *Dolichoderus taschenbergi* (Mayr) var. *aterrimus* Wheeler (*D. taschenbergi* var. *gagates* Wheeler).

STATEN ISLAND: A winged male near the seashore, June 4, 1912; perhaps not nesting on the island (Ds. Coll.). LONG ISLAND:

Wyandanch; Calverton; Central Park; Amagansett; Yaphank; Pinelawn; Massapequa; about a mile north of Coram (Ds. Coll.).

Ants of this species were attending soft, young galls produced by an apparently undescribed cynipid on very young acorns of *Quercus nana,* at Jamesburg, N. J., September 19, 1908.

36. *Dolichoderus plagiatus* (Mayr).

Staten Island: Long Neck; Tottenville; Watchogue (Ds. Coll.). Long Island: Wyandanch (F. M. Schott Coll.); Yaphank; Amagansett; south of Smithtown; Massapequa; West Hills (Ds. Coll.). At Yaphank, July 13, 1907, numerous workers of this ant were attending the nectaries at the base of the leaf-blade of *Populus grandidentata,* on the upper side of the leaf, in company with many other ants, flies, beetles, etc.

37. *Dolichoderus plagiatus* var. *inornatus* Wheeler.

Staten Island (Ds. Coll.). Long Island: Pinelawn; Yaphank; south of Smithtown (Ds. Coll.).

38. *Dolichoderus plagiatus* subsp. *pustulatus* Mayr.

Staten Island: Tottenville (Ds. Coll.). Long Island: Yaphank; south of Smithtown; Massapequa; Wyandanch (Ds. Coll.).

39. *Dolichoderus plagiatus* subsp. *pustulatus* var. *beutenmuelleri* Wheeler.

Long Island: Coram; Wyandanch; Massapequa; Farmingdale; south of Smithtown; Selden (Ds. Coll.).

FORMICINAE.

40. *Brachymyrmex heeri* Forel subsp. *depilis* Emery.

Staten Island: New Springville, nest under stone, April 15, 1910 (Ds. Coll.). Long Island: Cold Spring Harbor (Wm. M. Wheeler Coll.).

This is the smallest of the local ants and seems to be subterranean or nocturnal in habits.

41. *Prenolepis imparis* (Say).

Staten Island: Tottenville; New Brighton; Watchogue; Long Neck; Annadale (Ds. Coll.). Long Island: Amagansett; Yaphank; Calverton; Montauk; Pinelawn; Deep Pond, Wading River;

Gardiner's Island (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

On March 29, 1910, the departure of the winged sexes from the nest was witnessed.

42. *Prenolepis imparis* var. *testacea* Emery.

STATEN ISLAND: Tottenville (Ds. Coll.). LONG ISLAND: Wading River; Amagansett (Ds. Coll.).

This is a pale-colored form more commonly found in pine barren country. According to Prof. Wheeler, it seems to be somewhat nocturnal in its habits.

43. *Prenolepis* (*Nylanderia*) *parvula* Mayr.

STATEN ISLAND: Long Neck; Arrochar; Tottenville; Watchogue, nesting in sand (Ds. Coll.). LONG ISLAND: Pinelawn; Wyandanch; Central Park (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

Prenolepis (*Nylanderia*) *longicornis* (Latreille), the "crazy ant," in all probability exists in Brooklyn, since it was found in houses in New York City on several occasions. Its original home is India, whence it has spread over a large part of the world and has now become one of the house ants of this country.

44. *Lasius niger* (Linnaeus) var. *americanus* Emery.

STATEN ISLAND: Common everywhere: Arrochar; Arlington; Watchogue; Long Neck; etc. (Ds. Coll.). LONG ISLAND: Flatbush; Rockaway Beach (F. M. Schott Coll.); Maspeth (C. E. Olsen Coll.); Brooklyn; Yaphank; Fire Island; Gardiner's Island; Pinelawn; Wyandanch (Ds. Coll.); Jamaica (J. B. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

This is the most abundant and common ant of this vicinity. Workers were seen carrying sand out of their nest as early as March 31 and as late as November 11. At Jamaica, L. I., April 4, 1920, many nests were found under stones in a field, all containing numerous hibernating coccids and aphids. Winged sexual forms were common on Turnpike Road, S. I., April 19, 1920. This species occasionally builds "cow-sheds" over Homoptera, composed of minute fragments of sticks, leaves, and other vegetable matter, also some grains of sand. They are more fragile than those built by *Crematogaster*. At Yaphank, L. I., on July 26, 1909, it was observed how this ant had in several instances made covered ways, many feet in extent, between the ridges in rough bark of locust trees, leading to its "cows."

45. *Lasius* (*Chthonolasius*) *brevicornis* Emery.

LONG ISLAND: Long Beach (F. M. Schott Coll.); Yaphank (Ds. Coll.).

46. *Lasius* (*Chthonolasius*) *flavus* (Linnaeus) subsp. *nearcticus* Wheeler (*Lasius myops* Forel).

LONG ISLAND: Cold Spring Harbor (Wm. M. Wheeler Coll.).

This species lives in small colonies, in damp, shady woods, under stones or leaf-mould.

47. *Lasius* (*Chthonolasius*) *umbratus* (Nylander) subsp. *mixtus* (Nylander) var. *aphidicola* (Walsh).

STATEN ISLAND: South shore; Mariners' Harbor (Ds. Coll.). LONG ISLAND: Gardiner's Island (Ds. Coll.).

A nest in a stump, at Staten Island, opened on April 10, contained aphids.

48. *Lasius* (*Chthonolasius*) *umbratus* subsp. *minutus* Emery.

STATEN ISLAND: New Springville, forming a large mound nest (Ds. Coll.).

49. *Lasius* (*Acanthomyops*) *interjectus* Mayr.

STATEN ISLAND: Found on many occasions (Ds. Coll.). LONG ISLAND: Coram (Ds. Coll.).

A nest under bark, at the base of a tree, opened June 1, 1907, emitted an odor like that of citronella; another in a rotten log smelled strongly of formic acid when opened May 15, 1916.

50. *Lasius* (*Acanthomyops*) *claviger* (Roger).

STATEN ISLAND: Common in many places: Clove Valley; Princess Bay; etc. (Ds. Coll.). LONG ISLAND: Selden; Amagansett; Riverhead; Long Pond, Wading River; Gardiner's Island (Ds. Coll.); Huntington; Flatbush (F. M. Schott Coll.); North Beach; Maspeth (C. E. Olsen Coll.); Jamaica (J. B. Coll.).

This is a common species, nesting under stones along the edges of woods. The deälated females are occasionally found walking about on mild days in winter.

51. *Lasius* (*Acanthomyops*) *latipes* (Walsh).

Staten Island: Tottenville and elsewhere (Ds. Coll.). Long Island: Selden; Yaphank; Riverhead; Rockaway; West Hills; Wyandanch; Gardiner's Island (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

The nest of this species is rather common in grassy fields, under large stones. One found on Staten Island, April 14, 1907, contained many aphids.

52. *Lasius* (*Acanthomyops*) *murphyi* Forel.

Staten Island: St. George; New Brighton; Clove Valley; Watchogue (Ds. Coll.). Long Island: Rockaway; Baldwin (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

53. *Formica sanguinea* Latreille subsp. *rubicunda* Emery.

Long Island: Coram (Ds. Coll.).

54. *Formica sanguinea* subsp. *subintegra* Emery.

Staten Island: New Brighton; Clove Valley; Watchogue; etc. (Ds. Coll.). Long Island: Yaphank; Half Way Hollow Hills; Riverhead; Pinelawn (Ds. Coll.).

The nests are usually placed under stones in grassy places along the edges of woods. This ant keeps numerous slaves of the black species, *F. fusca* var. *subsericea,* and is often seen carrying one of these about; occasionally workers of *F. schaufussi* are also kept in the nest. At Watchogue, S. I., July 14, 1906, this ant was seen raiding a nest of *Aphaenogaster,* taking the dead victims home for food. Raids either for pupae or food are generally made on the warmest of days.

55. *Formica truncicola* Nylander subsp. *integra* Nylander.

Staten Island: Richmond; near Bradley's Road; Reed's Valley; Great Kills (Ds. Coll.). Long Island: Rockaway Beach (F. M. Schott Coll.); Riverhead; Yaphank; Wyandanch; Deep Pond, Wading River; Half Way Hollow Hills; West Hills (Ds. Coll.); Long Beach (Wm. M. Wheeler Coll.).

This subspecies nests in piles of large stones or old logs and stumps, often in great colonies, and prefers sunny glades or clearings in the woods. Like *F. difficilis,* it attends the young of the membracid *Thelia bimaculata.* At Yaphank, L. I., on July 26, 1909, the young of this tree-hopper were found covered over by these ants about the base of some locusts, and they had also carried material about 1 foot 5 inches up into the rough bark of the trees. The nests of *integra* are not as common on Long Island and Staten Island as those of *F. exsectoides*. They usually consist of bits of wood, leaves, etc., piled up against an old stump or log, and while they receive the warm rays of the sun, they are at the same time much exposed to beating rains. A much better protected nest was found on August 5, 1913, near Riverhead, L. I., where a tree with a hollow base had been chosen by the ants; into it they had piled the usual bits of vegetable matter. In this instance they at least had a substantial roof over their heads. Another case of a substantial roof was a nest found September 19, 1920, on the ledge of the immense drift boulder near Setucket, L. I., built about and under a piece of old tin, which, when removed, caused the ants to squirt formic acid at the intruder. Sometimes these above-ground parts of the nest have some outlying annexes, as, for instance, in the one we once discovered against what appeared to be an old bear trap in the Adirondacks, where the ants also had a collection of material on one of the upper logs entirely separated from the material against the lower logs and on the ground.

At Jamesburg, N. J., on September 20, 1908, a number of workers of this ant were attending galls of *Disholcaspis mamma* Walsh, on *Quercus bicolor,* for the secretion found at the surface.

56. *Formica truncicola* subsp. *obscuriventris* Mayr.

LONG ISLAND: Riverhead; Coram; Pinelawn; Wading River; north of Amagansett; Gardiner's Island (Ds. Coll.); Cold Spring Harbor (J. B. Coll.).

57. *Formica truncicola* subsp. *obscuriventris* var. *gymnomma* Wheeler.

LONG ISLAND: Cold Spring Harbor (Wm. M. Wheeler Coll.).

58. *Formica difficilis* Emery.

STATEN ISLAND: Long Neck; Watchogue; Clove Valley; etc. (Ds. Coll.). LONG ISLAND: Coram; Gardiner's Island; Calverton; Yaphank; Selden; Orient; Pinelawn; Half Way Hollow Hills; Wyandanch; Riverhead (Ds. Coll.).

The nesting habits of this species are similar to those of *F. truncicola* subsp. *integra*. At Yaphank, L. I., on July 26, 1908, piles of bits of leaves, moss, sticks, etc., were found about the base of two locust trees that constituted a shelter for immature tree-hoppers, *Thelia bimaculata*. These shelters were built by *F. difficilis* and were cavernous within so that the ants could attend the young tree-hoppers. When the shelters were examined, the ants gave battle by biting and spraying formic acid. The same species of ants was also attending some mature and immature *Thelia bimaculata* further up on the trunks of the small locusts. There was one large, deformed tree-hopper that could not fly that was being patted on the back by a *Formica difficilis*, and the others, both young and mature insects, seemed to regard the attentions of the ants very favorably. The mature *Thelia* could easily have flown away if they were annoyed by the ants, as they so readily did when touched by the human hand ever so gently.

59. *Formica exsectoides* Forel.

Staten Island: Richmond; Kreischerville; Annadale; Mariners' Harbor; near Bradley's Road; Tottenville (Ds. Coll.). Long Island: Wyandanch (F. M. Schott Coll.); north of Amagansett; Yaphank; Deep Pond, Wading River; Selden; Montauk (Ds. Coll.); Farmingdale (J. B. Coll.).

The mound-building ant is generally distributed on Staten Island, but its conspicuous nests are often dug into, which ultimately destroys a colony. North of Amagansett, L. I., in the direction of the Fire Place, some large nests of this species of ant were found in September, 1910; one nest was 10 feet in diameter and 2 feet 9 inches high. Another considerable colony of the mound-building ant is near the western end of Deep Pond, at Wading River, L. I. Near Great Kills, S. I., a colony of the tree-hopper *Vanduzea arquata*, in all stages from little ones up, was found on a locust tree and was attended by *F. exsectoides*.

The mound nests of this *Formica* contain many myrmecophilous beetles. In the Journal of the New York Entomological Society, Vol. XVI, 1908, p. 59, Mr. Leng enumerates the following beetles taken by him on April 28, 1908, in the nests of *Formica exsectoides* at Newfoundland, N. J.: *Tachyura incurva* (Say), *Ptoma-*

phagus parasitus (Leconte), *Cedius ziegleri* Leconte, *Hetaerius brunneipennis* Randall, *Megastilicus formicarius* Casey, *Cremastocheilus castaneae* Knoch, and *Batrisodes fossicauda* Casey.

60. *Formica fusca* Linnaeus var. *subsericea* Say.

STATEN ISLAND: A very common ant everywhere, even in the thickly settled parts of the island, where it is often seen on sidewalks. LONG ISLAND: Flatbush (F. M. Schott Coll.); Central Park; Wading River; Gardiner's Island; Wyandanch; West Hills; Amagansett; Yaphank (Ds. Coll.); Flushing (J. B. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

This ant nests usually in sunny, grassy places and either constructs low mounds or excavates its galleries under stones, boards, the bark of stumps, etc. A nest, 18 feet in diameter, was found at the southern end of Deep Pond, Wading River, L. I., July 26, 1914. At Flushing, L. I., this ant was seen attending coccids on elder. In May, 1913, at Wading River, L. I., a geometrid moth, *Therina pellucidaria,* was seen to fall to the ground from a pine tree, and upon investigation it was discovered that it had been attacked by a *F. fusca,* which was still clinging to it. This species is the usual slave of *Formica sanguinea.*

61. *Formica* (*Proformica*) *neogagates* Emery.

STATEN ISLAND (Ds. Coll.). LONG ISLAND: Gardiner's Island (Ds. Coll.); Cold Spring Harbor (J. B. Coll.).

62. *Formica* (*Neoformica*) *pallidefulva* Latreille subsp. *schaufussi* Mayr.

STATEN ISLAND: Common in many places: Todt Hill; Watchogue; etc. (Ds. Coll.). LONG ISLAND: Pinelawn; Amagansett; Yaphank; Deep Pond, Wading River; Wyandanch; Gardiner's Island (Ds. Coll.).

At Tottenville, S. I., on May 29, 1909, a tiger-beetle, *Cicindela generosa,* was seen to attack a *F. p. schaufussi* running on the sand, and then let it go suddenly. Later the same ant twice approached the *Cicindela* and on both occasions the beetle ran away.

63. *Formica pallidefulva* subsp. *schaufussi* var. *incerta* Emery.

STATEN ISLAND: Todt Hill (Ds. Coll.). LONG ISLAND: Wyandanch; Hempstead (F. M. Schott Coll.); south of Smithtown (Ds. Coll.).

64. *Formica pallidefulva* subsp. *nitidiventris* Emery.

Staten Island (Ds. Coll.). Long Island: Amagansett; Calverton; Southhold; Gardiner's Island; Montauk (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

65. *Formica pallidefulva* subsp. *nitidiventris* var. *fuscata* Emery.

Staten Island: Todt Hill (Ds. Coll.). Long Island: Wyandanch; Amagansett; Gardiner's Island; Central Park; Montauk (Ds. Coll.).

66. *Polyergus lucidus* Mayr.

Long Island: Long Pond, Wading River, September 1, 1919; Pinelawn, September 28, 1907; Selden, August 30, 1916 (Ds. Coll.).

In each case this ant was found with its slave, *Formica pallidefulva schaufussi.* The "shining slave-maker" is quite unable to feed itself, excavate its nest, or care for its own brood, but depends for this on the *schaufussi* workers which it kidnaps from their nest in the pupal stage.

67. *Camponotus castaneus* (Latreille).

Staten Island: June 3, 1893, nest under a stone (Ds. Coll.). Long Island: Central Park (Ds. Coll.).

This species and the following form nests in the ground, usually under stones or logs.

68. *Camponotus castaneus* subsp. *americanus* Mayr.

Staten Island: New Brighton and many other places (Ds. Coll.). Long Island: Wyandanch; Yaphank; Half Way Hollow Hills; Deep Pond, Wading River; Melville; Rockaway Beach; Pinelawn; Gardiner's Island (Ds. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

This ant is much more common in our vicinity than the typical form. It is more or less nocturnal and is often found on the sugar mixture placed on the trunks of trees for moths.

69. *Camponotus herculeanus* (Linnaeus) subsp. *pennsylvanicus* (De Geer).

Staten Island: Common (Ds. Coll.). Long Island: Central Park; Yaphank; Fire Island; south of Smithtown; Gardiner's Island; Southhold (Ds. Coll.); Huntington (F. M. Schott Coll.);

Springs (J. B. Coll.); Cold Spring Harbor (Wm. M. Wheeler Coll.).

This is the common "carpenter ant," which nests usually in shady woods, in old logs and stumps. Occasionally it invades the woodwork of farmhouses and then visits the kitchen for sweets. The beetle *Xenodusa cava* (Leconte) is a common inmate of its nest. In the Proceedings of the Staten Island Association of Arts and Sciences for November, 1907, several nests of this species are described, and a fine example of their carpenter work in white pine from near Richmond Valley, S. I., is on exhibition in the American Museum of Natural History. Their nests have been found in the trunks of many species of native trees, but the nest differs somewhat with the character of the wood. For many years a nest existed in an old cherry tree near St. George, S. I., and at times little heaps of fine particles of wood accumulated at the base of the tree, indicating the activity of the ants within. Ants from this nest would ascend a near-by pear tree and, choosing one or two pears, eat out the interior, leaving large caverns. As a rule, there was no indication from an external view of the pear, of its partly hollow condition, except, of course, the hole used as a door-way by the ants. They were observed at this work on several different occasions, and in August, 1888, it was noted that they had eaten into two pears before they were ripe and made considerable chambers within. However, these same ants were in part beneficial, for on August 15, 1886, one of the ants was seen with a caterpillar of unknown species, and another with a sawfly larva off of a near-by currant bush. These ants, when approached, will sometimes vibrate their abdomens. On another occasion one of these ants was seen in the act of attacking an *Apatela* moth resting on the trunk of a tree, but when the moth flirted its wings the ant went on its way up the tree and let the moth alone. As with the species of *Formica* already referred to, this ant was also observed at Yaphank, L. I., in July, 1908, attending a colony of immature *Thelia bimaculata*. The *Camponotus* had made a shelter for the tree-hoppers at the base of a young locust tree, but its construction was different from the shelters made by *Formica*.

70. *Camponotus herculaneus* subsp. *pennsylvanicus* var. *ferrugineus* (Fabricius).

Staten Island: Richmond Hill; Watchogue; Clove Valley; etc. (Ds. Coll.). Long Island: Jamaica; Wyandanch (F. M. Schott Coll.); Yaphank; Amagansett; Coram; Melville; Deep Pond and Long Pond, Wading River; Southhold; Cold Spring Harbor; Half Way Hollow Hills; south of Smithtown (Ds. Coll.).

Camponotus herculaneus subsp. *ligniperdus* var. *noveboracensis* (Fitch) has been recorded from Staten Island in Smith's list of New Jersey insects, but we have seen no specimens from that locality.

71. *Camponotus* (*Myrmentoma*) *caryae* (Fitch) (*C. fallax* var. *nearcticus* Emery).

Staten Island: Long Neck; Tottenville; etc. (Ds. Coll.). Long Island: Brooklyn (Wm. M. Wheeler Coll.); Queens (F. M. Schott Coll.); Wading River; Yaphank; Gardiner's Island; Riverhead; Pinelawn; Amagansett; Orient; Central Park; Half Way Hollow Hills (Ds. Coll.); Cold Spring Harbor (J. B. Coll.).

This species and its various forms nest in dead twigs of trees, hollow stems of elder bushes, dry blackberry stalks, etc.

72. *Camponotus caryae* var. *minutus* Emery.

Staten Island: Long Neck; Clove Valley; etc. (Ds. Coll.). Long Island: Melville (F. M. Schott Coll.); Jamaica (Wm. M. Wheeler Coll.); Central Park; Massapequa; Yaphank; Amagansett; Deep Pond, Wading River; Coram (Ds. Coll.).

73. *Camponotus caryae* var. *pardus* Wheeler.

Long Island: Queens (F. M. Schott Coll.); Jamaica (G. v. Krockow Coll.).

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—— 1914. The fungus-growing ant on Long Island, New York. Journ. New York Ent. Soc., XXII, pp. 64–65.

—— 1915. A Long Island ants' nest eighteen feet in diameter. Journ. New York Ent. Soc., XXIII, p. 69. Describes a large nest of *Formica fusca* var. *subsericea* found at Deep Pond, Wading River.

—— 1915. Long Island collecting notes. The fungus-growing ant near Smithtown. Bull. Brooklyn Ent. Soc., X, p. 81.

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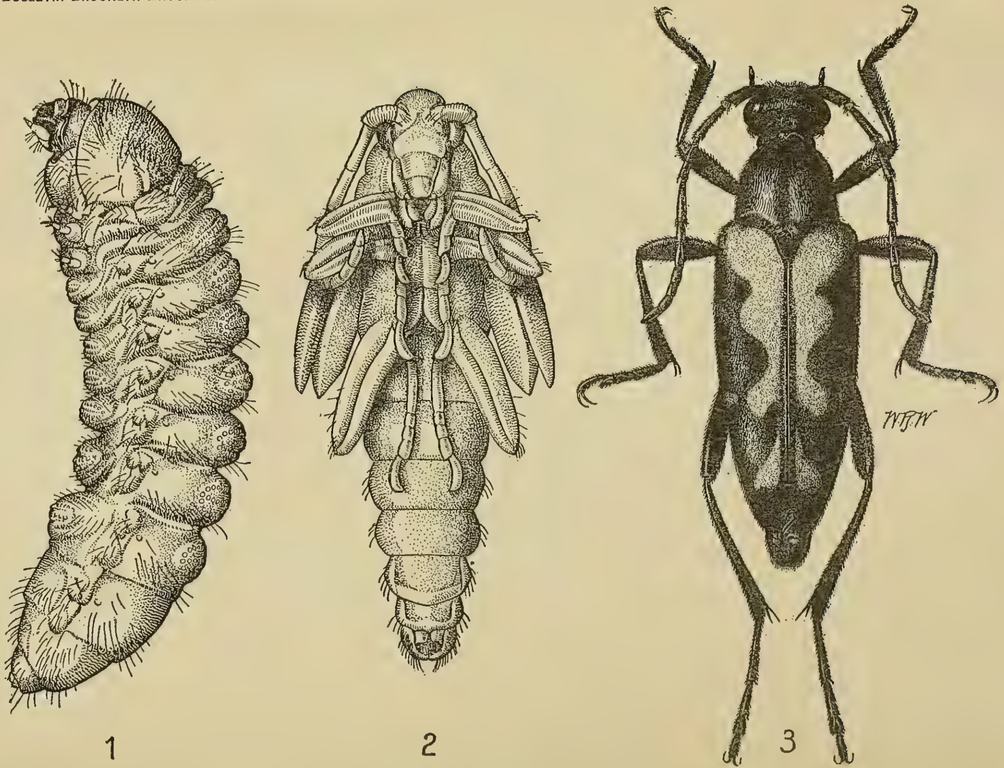
Wheeler, Wm. M. 1905. An annotated list of the ants of New Jersey. Bull. American Mus. Nat. Hist., XXI, pp. 371–403.

—— 1906. On the founding of colonies by queen ants, with special reference to the parasitic and slave-making species. Bull. American Mus. Nat. Hist., XXII, pp. 33–105, Pls. VIII–XIV. On Plate XIII, figs. 1 and 2, and Plate XIV, fig. 1, are reproduced photographs of the fine examples of nests of *Formica exsectoides* found near Arlington railroad station, Staten Island, September 10, 1904.

A new form of Harpalus.—*Harpalus gregarius* Fauvel is one of the commonest beetles under stones in the Madeira Archipelago. On January 31, 1921, I collected it at about 3,000 feet, near the Pico do Serrado, in Madeira. On January 20 I obtained a good series on the Ilheo de Cima (Lighthouse Island), Porto Santo. Wollaston long ago called attention to the peculiarities of the Porto Santo form, but remarked that it was variable. I find, however, that the I. de Cima specimens constantly differ, not only in the greater width of the prothorax behind, but also in a character not noticed by Wollaston. In Madeira the innermost stria of each elytron curves outward basally to meet the second stria, while mesad of this is a deeply incised short-curved stria, its posterior end quite free. In the Porto Santo (I. de Cima) form the striae are not so deeply incised and the innermost stria, though bent, continues to the base without approaching the second. Laterad of this is a somewhat oblique short detached stria, which is morphologically equivalent to the deflected end of the first stria in the Madeira insects. The I. de Cima form is therefore quite recognizably distinct, and may be known as subsp. *cimensis,* nov.—T. D. A. Cockerell.



Typocerus sinuatus, Newm.

OBSERVATIONS ON TYPOCERUS SINUATUS NEWMAN AS A FORAGE PLANT PEST.

By J. S. Wade, Scientific Assistant, Bureau of Entomology.

The larval stage of *Typocerus sinuatus* Newman, of the Coleopterous family Cerambycidae, hitherto supposed to be of economic importance solely as a pest of forest trees, recently has become known to have potential possibilities as a grass pest in the central Great Plains region. The data here presented are based upon observations made by the writer and other assistants of the Bureau of Entomology in southern Kansas and northern Oklahoma, during the years 1913–14, upon the insect as a pest of the root system of *Andropogon scoparius* Michx.

Andropogon scoparius Michx., commonly known as Little bluestem, is abundant throughout the eastern United States, is a valuable forage grass, and forms part of the wild prairie hay in the eastern portion of the central Great Plains region. It has long been known as one of the favorite hibernating plants for the chinch bug, *Blissus leucopterus* Say. It was while pulling apart the roots of this grass in search of overwintering chinch bugs that the larvae of *Typocerus sinuatus* Newm. were first noticed to be quite numerous as pests thereon.

Injury: The character of injury wrought by these insects consists of eating out the crown of the plants so that the stems break off just below the ground surface. On breaking apart the particles of earth found beneath bunches of infested grass, such particles appear to contain many fragments of the crown and roots of the plants, and present the same general appearance as do the burrows of other wood borers. The work of this insect may be distinguished from that of the various species of Crambidae by the presence in these burrows of the feces of the larvae. As many as five larvae often may be found boring into a single clump. Oftentimes they entirely eat away the base of the plants. The cutting away of the stems and destruction of the center of the root systems render the subsequent growth of the infested clumps stunted and scattered. While the larvae by preference appear most frequently to cut out the center of the plants, leaving only a rim of growth around the outside, they also feed in, and at times hollow out, small cavities in the lower part of the stems. It is noticeable that they feed in late spring upon old rather than upon green stems. The extent of damage covers considerable areas in Kansas, noteworthy injury occurring in meadows and pastures in Sumner, Sedgwick, Kingman, Pratt, Ford, Meade, and Seward Counties, and in Oklahoma in Tulsa County.

HOST PLANTS: In addition to *Andropogon scoparius* Michx., the larvae of the insect also are occasionally found feeding upon the roots of *Sporobolis airoides* Torr., bunch grass; *Sorghastrum nutans* Linn., Indian grass; and *Agropyron smithii* Rydb., Colorado bluestem. The adults also have been collected from *Dracopis amplexicaulis* Vahl; *Ratibida columnaris* Linn., cone flower; *Rudbeckia flava* Moore, Black-eyed Susan; *Aster* sp., Yellow aster; and *Linum lewisii* Pursh., Wild flax.

DESCRIPTIONS.

The egg stage of this insect was not observed.

The larva (Fig. 1) is of the usual cerambycid form, elongate, subcylindrical, somewhat wider just behind the head. It is cream color, with brownish head and yellowish-brown mouth parts. The intersegmental constrictions are deep and well defined, the segments wrinkled. The sides of the body are sparsely covered except on certain prominences with acutely pointed tubercles, in the end of each of which there is present a tiny seta. The segments slightly tapering from the prothorax to the caudal extremity. Ten brown spiracles along each side, the first spiracle largest. Little change of color occurs during the growth of the larva. Average length of living mature larva is 14.5 mm. Width at widest part just behind the head is 4 mm. In general shape the very young larva is very much like the mature larva. The larva is quite helpless when removed from the burrow.

The pupa (Fig. 2) is soft, white, and oval, with legs, wing pads, and antennae close to the body. Form slender, averaging 9 mm. in length by 2.5 mm. in width. Shortly before transformation to adult it becomes darker with brownish color.

The adult (Fig. 3) is a slender black beetle, 10 to 13 mm. in length, with rather dense yellowish pubescence. Thorax strongly convex, narrow in front and with sides rounded, elytra having large yellow spots, the three basal ones connected near suture, tips black and tapering behind.

Life History: In the latitude of southern Kansas the larvae of various sizes from 1 mm. to full-length larva overwinter in cells beneath the infested plants and do not feed during such periods. In the spring they early resume their activity. The feeding habits do not vary to any noticeable degree with the various stages of the larvae, though their size may affect their position in the host plants, many small larvae being found in hollowed-out lower portions of stems, whereas the larger larvae are always to be found down in the main burrows. The growth of the larvae is not rapid. The larger larvae discontinue feeding about the middle of April, pupate in tiny earthen cells about ten days thereafter, and the adults issue about 30 days thereafter, early in June. The eggs are probably deposited shortly thereafter, but the process of deposition and the length of the egg stage are not yet known. Larvae of widely varying size from very small to those nearly mature are often found together in the same clumps. There are indications that the length of the larval stage varies materially with the quantity and quality of the food supply, for it has been noticed that in burned-over clumps of grass, which afford less food, the growth of the larval stage becomes greatly retarded. Under such conditions there are indications of a life duration of two seasons from egg to adult. The burning of the dried grass in late fall or early spring does not greatly injure the larvae, only an occasional one being destroyed thereby. Such procedure would probably be of very slight value as a control measure. The adults are most commonly present in numbers on the grasses and near-by weeds during the month of June. They often crawl down into the grass clumps and probably deposit the eggs there. No adults are to be found in infested areas after July.

WANTED—More two- and three-line notes to fill in.—Editor.

A RECLASSIFICATION OF THE SUBFAMILIES AND GENERA OF THE NORTH AMERICAN SYRPHIDAE.

By Raymond C. Shannon, Bureau of Entomology.

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(Continued from p. 128, vol. XVI.)

MILESINAE.

Milesia is such an aberrant genus, neither closely allied to Eristalinae nor Xylotinae (formerly placed under Milesinae) and has such distinctive characters that it is deemed best to consider it as a separate subfamily. The head is of the *Xylota* type; the discal crossvein has the same position and slant as in *Spilomyia;* the marginal cell is closed and the third longitudinal vein has a downward loop as in *Meromacrus* and *Eristalis.*

At present it is rather a matter of opinion whether *Milesia* is more closely allied to *Meromacrus* (Eristalinae) or to *Spilomyia* (Xylotinae). *Milesia* has not the broad squamae and the resulting development of the first tergite noted for *Meromacrus* under Volucellinae; but the face is broadly pilose as in *Meromacrus* (although the pile is tomentose in this genus) and both of these genera have very large posterior thoracal spiracles.

Spilomyia also possesses the broadly pilose face, one of the very few genera in Xylotinae to have this character. The posterior thoracal spiracle, however, is, proportionately, much smaller.

Only one genus, *Milesia,* characters given in table of subfamilies.

XYLOTINAE, new subfamily.

There has always been considerable difficulty in knowing what genera should compose the Xylotinae, usually called Milesinae. Several genera which are included here in Xylotinae are usually placed in Eristalinae, while several genera placed in Chilosinae may eventually be considered as belonging to Xylotinae.

A character, seemingly of much importance, namely, the distribution of pile on the face and frons, has been used in this paper to include *Syritta, Tropidia, Pterallastes,* and *Teuchocnemis* in Xylotinae. If this character were stressed in classifying Chilosinae, this subfamily would be further divided, making other subgroups thereby, which may more properly be considered under Xylotinae. The Xylotinae tend towards having the face and frons destitute of the pile which is characteristic of Eristalinae and Chilosinae (*sensu stricto*); and in the genera included in Xylotinae, except *Ferdinandea, Eumerus,* and *Spilomyia,* the males have the face and frons bare, except along the eye margins; and the females, besides having the face bare, have a bare space of greater or lesser width immediately above the antennae. The densely pubescent forms of *Crioprora, Criorrhina,* and *Merapioides* have the pile on the head somewhat more generously distributed.

TABLE OF GENERA.

1. Scutellum, margin of thorax and pleurae with bristles; general color bronzy aeneous; head of *Chilosia* type. (Figure 1. Probably belongs in Chilosinae) ....*Ferdinandea.*

— Thorax without bristles; general color not bronzy aeneous except in *Calliprobola*..................................2.

2. Thorax with distinct yellow markings besides those on humeri and a single spot on the pleuras. "Wasp flies"........16.

— Thorax without distinct yellow markings of the ground color except (certain species of *Cynorrhina* and *Somula*) rarely on the humeri and a single spot on the pleurae.........3.

3. Apical crossvein with a prominent, outward directed angle, strongly recurrent where it meets third vein; face flat, slightly produced at mouth margin and covered with pile. *Eumerus.*

— Apical crossvein not outwardly angulated and recurrent....4.

4. Apical crossvein sinuate, forming a sprawling "W"; anal furrow less than one third the length of anal cell; all basal cells destitute of the usual clothing of villi, causing the wings to have a glassy appearance; hind femora a little shorter than two and one half times their width, and are held in longitudinal groove-like impressions of the abdomen during flight; chitinous parts of sternites only one third the entire width of the abdomen; head subhemispherical, the eyes composing the greater part of the head; face subcarinate ....*Syritta.*

— Without the above conglomeration of characters..........5.

5. Hind femora with an apical saw-tooth prominence; face subcarinate to carinate............................*Tropidia.*
— Hind femora without a saw-tooth prominence; face not carinate ....6.

6. Third vein with a downward loop into discal cell; sixth vein beyond anal cell, prolonged well forward. (*Pterallastini*) .7.
— Third vein straight or with a very gentle downward curve; sixth vein entering wing margin shortly after anal cell...8.

7. Mesonotum ochraceous; sixth vein entering wing margin; posterior antecoxal piece bare..................*Pterallastes.*
— Mesonotum grayish, or reddish black; sixth vein evanescent some distance from wing margin; posterior antecoxal piece with distinct pile..........................*Teuchocnemis.*

8. Epistoma abruptly truncate, face in profile deeply and evenly concave (*Xylotini.* Figure 4*a*).......................9.
— Epistoma produced either well forward or protruding downwards ....12.

9. "Bumble-bee flies" with dense yellow pile on anterior part of mesonotum and black on posterior part; abdomen broad; posterior antecoxal piece bare..................*Pocota.*
— Not bumble-bee-like in appearance and without dense yellow pile; abdomen elongate and usually with parallel sides..10.

10. General color of abdomen, and usually the thorax, brassy aeneous; head broadly oval.................*Calliprobola.*
— Abdomen and thorax not brassy aeneous................11.

11. Pile on thorax and abdomen very short; head broadly oval; posterior antecoxal piece bare or hairy...........*Xylota.*
— Pile rather long; head triangular; posterior antecoxal piece with distinct pile except in *B. frontosus*.....*Brachypalpus.*

12. Epistoma produced forward beyond base of antennae; long pilose species with posterior antecoxal piece bare; antennae inserted below middle of eyes.................*Crioprora.*
— Epistoma produced downwards, or face tuberculate; antennae usually inserted well above middle of the eye (*Criorrhini*) ....13.

13. Long pilose species with posterior antecoxal piece hairy; bumble-bee-like in appearance (except *Merapioides*); third antennal joint greatly widened apically and with arista usually inserted half way or more from base; males dichoptic...14.
— Pilosity of usual length; posterior antecoxal piece bare; third antennal joint obtusely quadrate and with arista near base; unlike bumble-bees in appearance...................15.

14. Pile entirely pale in color; arista placed at tip of conically produced third antennal joint .... *Merapioides.*

— "Bumble-bee syrphids" .... *Criorrhina.*

15. Antennae inserted on prominence slightly higher than vertex of head; lateral margins of abdomen yellow ...... *Somula.*

— Antennae inserted below vertex of head; lateral margins of abdomen not entirely yellow .... *Cynorrhina.*

16. Antennae inserted near middle of head; face not longer than front .... *Temnostoma.*

— Antennae long or short and inserted above middle of head on a conical process; face much produced downwards; sixth vein entering wing margin shortly beyond anal cell. *Sphecomyia.*

— Antennae inserted above middle of head; face not produced downwards; sixth vein prolonged obliquely outward from anal cell; hind femora with conical, tooth-like projection below near distal end .... *Spilomyia.*

CERIOIDINAE.

One genus; in this country easily divided into *three* subgenera.

A. Antennal process very elongate, quite as long as length of antennae exclusive of style; a stigmatical crossvein, or at least a distinct thickening present.

  1. Abdomen strongly constricted basally; loop in third vein without adventitious branch; ambient vein present .... *Monoceromyia,* new subgenus.

  2. Abdomen not constricted; loop in third vein with adventitious branch projecting in discal cell; ambient vein rarely present .... *Cerioides.*

B. Antennal process shorter than first antennal joint, neither stigmatical crossvein nor a distinct thickening present at tip of auxiliary vein; abdomen constricted basally. *Sphyximorpha.*

NOTES ON SOME GENERA AND SPECIES OF SYRPHIDAE.

Calliprobola Rond. Includes *Brachypalpus pulcher, B. sorosis, Calliprobola aldrichi, C. crawfordi,* and *C. opacus.*

Ceria Fabr. = Cerioides Rond.

Ceriogaster Will. Tropical; no material at hand.

Cynorrhina Will. Ranks as genus.

Doros Meig. (European.) *Xanthogramma aequalis* Lw. is placed therein.

Eumerus Meig. *E. strigata* Fall. is now well established in North

America. *Microxylota robii* Jones is synonym of this species, according to Aldrich.

Eumyiolepta Shn. Erected for *Myiolepta strigilata* Lw.

Lepidostola Mik. Tropical; no material at hand.

Microxylota Jones (Jones, Ann. Ent. Soc. Am., x, 231) is synonym of Eumerus (Aldrich).

Ocyptamus Macq. Subgenus of *Baccha.* Abdomen not constricted basally.

Platynochaetus Wd. Tropical; no material at hand.

Polydontomyia. Takes rank over *Triodonta* and *Polydonta;* not congeneric with *Pterallastes,* but belongs in Helophilini.

Rhysops Will. Subgenus of *Melanostoma;* face with transverse grooves.

Salpingogaster Schin. Tropical; probably subgenus of *Baccha;* third vein is looped downwards.

Scaeva Fabr. Probably subgenus of *Syrphus;* used for *Catabomba pyrastri.*

Senogaster Macq. = *Acrochordonodes* Big. *S. comstocki* is generally believed to be a synonym of *A. dentipes,* which is not of North American distribution.

Sphyximorpha Rond. = Cerioides Rond. Retained as a subgenus.

Xanthandrus Verr. Subgenus of Melanostoma; has flat, elliptical abdomen.

Chilosia parva Will. belongs in Melanostoma; probably melanic specimens.

Chilosia nigripennis Will. = Chrysogaster nigripennis Will.

Chilosia versipellis Will. = Chrysogaster versipellis Will.

Tropidia cooleyi Seamans (Seamans, Ent. News, xxviii, 342) = *Helophilus modestus* Will. (According to Aldrich.)

Chart Showing Present Arrangement of the Syrphidae and the Corresponding Arrangements of Other Authors.

Shannon	*Williston*	*Verrall*	*Lundbeck*
Syrphinae			
Paragus	see Chilosinae	Paragus	Paragus
Platychirus	Platychirus	Platychirus	Platychirus
Pyrophaena	Pyrophaena	Pyrophaena	Pyrophaena
Melanostoma	Melanostoma	Melanostoma	Melanostoma
Syrphus	Syrphus	Syrphus	Syrphus
Scaeva	Scaeva	Scaeva	Scaeva
Eupeodes	Eupeodes		
Didea	Didea	Didea	Didea
Chrysotoxum	see Microdontinae	see Chrysotoxini	see Chrysotoxini
Baccha	omitted by Williston	Baccha	Baccha
Leucozona	Leucozona	Leucozona	Leucozona
Xanthogramma	Xanthogramma	Xanthogramma	Xanthogramma
Doros		Doros	Doros
Toxomerus			
Mesogramma	Mesogramma		
Allograpta	Allograpta		
Sphaerophoria	Sphaerophoria	Sphaerophoria	Sphaerophoria
Nausigasterinae			
Nausigaster	included in Chilosini		
Microdontinae			
Microdon	Microdon		
Mixogaster	Mixogaster		
see Syrphinae	Chrysotoxum	Microdon	

Chilosinae	**1. Chilosini, 2. Brachyopinae, 3. Sphegini**	**Syrphinae**	**Syrphinae**
Pipiza	Pipiza	Pipiza	Pipiza
Psilota	Psilota	Psilota	
Chrysogaster	Chrysogaster	Chrysogaster	Chrysogaster
Chilosia	Chilosia	Chilosia	Chilosia
Ferdinandea	1 doubtfully located	in Xylotinae	in Milesinae
Callicera		in Chrysotoxini	
Eumyiolepta			
Myiolepta	Myiolepta	in Milesinae	in Milesinae
Chalcomyia	Chalcomyia		
Brachyopa	Brachyopa	Brachyopa	Brachyopa
Hammerschmidtia	2 Hammerschmidtia	Hammerschmidtia	
Rhingia	Rhingia	Rhingia	Rhingia
Sphegina	3 Sphegina	Sphegina	Sphegina
Neoascia	Neoascia	Neoascia	Neoascia
Pelecocera	4 Pelecocerini	Pelecocera	
Chamaesyrphus		Chamaesyrphus	
Sericomyinae			
Sericomyia	Sericomyia	in Milesinae	in Milesinae
Condidea			
Arctophila	Arctophila	in Milesinae	in Milesinae
Pyritis			
Volucellinae			
Copestylum	Copestylum		
Volucella	Volucella	Volucella	Volucella
Eristalinae	**Eristalini**	**Eristalinae**	
Eristalis	Eristalis	Eristalis	Eristalis
Meromacrus	Meromacrus		
Mallota	Mallota	Mallota	Mallota
Helophilus	Helophilus	Helophilus	Helophilus
Merodon		Merodon	Merodon

see Xylotinae	Tropidia	Tropidia	in Milesinae
see Xylotinae	Teuchocnemis		
see Xylotinae	Pterallastes		
Milesinae	**Milesini**	**Milesinae**	**Milesinae**
Milesia	Milesia	Milesia	Milesia
see Xylotinae	Spilomyia	(remaining genera placed under Xylotinae)	(remaining genera placed under Xylotinae)
see Xylotinae	Sphecomyia		
see Xylotinae	Temnostoma		
Xylotinae	**Xylotini**	**Milesinae**	**Milesinae**
Eumerus		Eumerus	Eumerus
Syritta	Syritta	Syritta	Syritta
Tropidia	Tropidia	in Eristalinae	Tropidia
Pterallastes	see Eristalini		
Teuchocnemis	see Eristalini		
Xylota	Xylota	Xylota	Xylota
Brachypalpus	Brachypalpus	Brachypalpus	Brachypalpus
Calliprobola	Calliprobola	Calliprobola	
Pocota	Pocota	Pocota	
Criopora	Criopora		
Merapioides	Merapioides		
Criorrhina	Criorrhina	Criorrhina	Criorrhina
Cynorrhina	subgenus	Cynorrhina	Cynorrhina
Somula	Somula		
Temnostoma	see Milesini	Temnostoma	Temnostoma
Sphecomyia	see Milesini	in Chrysotoxini	
Spilomyia	see Milesini	Spilomyia	Spilomyia
		Arctophila	Arctophila
Cerioidinae		Sericomyia	Sericomyia
		Myiolepta	Myiolepta
Cerioides		Ferdinandea	Ferdinandea
		Milesia	Milesia

DESCRIPTIONS OF NEW SPECIES OF SYRPHIDAE.

Psilota thatuna n. sp.

Female.—Rather small, robust; shining bluish black. Eyes with dense, brownish pile. Frons clothed with fairly long black pile, with a slender longitudinal furrow, and a short distance above the antennae there is a shallow transverse furrow. Antennae reddish brown, darker on upper margin of third joint; first two joints together about two thirds as long as third; third joint rather broad and nearly twice as long as broad; arista as long as length of second and third joints combined and placed near base of last joint. Face in profile flat, a little swollen and retreating a little towards mouth; epistoma projecting slightly beyond base of antennae; clothed with rather pale, silky pile.

Thorax clothed with short, rather dense, black pile; edge of scutellum marginated and with longer hairs.

Abdomen broader than thorax, globose and shining; clothed with short black pile, which is somewhat longer and lighter at the anterior corners.

Legs largely black, knees and tarsi brownish yellow; posterior femora swollen.

Squamae and cilia, plumula and halteres largely brownish yellow.

Wings hyaline; typical *Psilota* venation.

Length: about 7 mm.; wing 5.75 mm.

Type locality.—Summit of Cedar Peak, Moscow Mts., Thatuna Range, Idaho. Four female specimens, July 10, 1920. R. C. Shannon, collector.

Type.—Cat. No. 24096, U. S. N. M. Two paratypes in author's collection.

Psilota buccata differs from *P. thatuna* as follows: General color greenish black; body clothed with whitish pile; third antennal joint uniformly blackish and three times as long as broad; face noticeably more inflated; color of legs more contrastingly yellow and black; abdomen less globose; wings pale yellow; fringe of cilia and bristles at base of costa yellowish (black in *thatuna*); color of squamae, halteres and plumula whitish. *P. thatuna* appears to be more nearly related to the European *Psilota anthracina.* This species differs, according to Verrall's description (British Syrphidae), in having pile on the abdomen extensively whitish, "in fact all the tip half bears whitish pubescence."

Another specimen (female from California) in the National Collection agrees with *P. thatuna* except for the absence of the longitudinal furrow on the frons and having a longer arista and shorter antennae.

Nausigaster chrysidiformis n. sp. (Fig. 5 *a* and *b*).

Female.—Medium sized, with rather dull metallic reflections of various hues; all the chitinous parts punctate. General shape of head hemispherical. Post-orbital region inflated, as wide as the frons at the ocelli, thickly punctate; a distinct indentation present opposite the humeral calli. Frons rather narrow at the ocelli, but widens rapidly toward the antennae, clothed with very short, stiff, black pubescence. Ocelli placed on a distinct protuberance; another callus present a short distance below, and the region between the two calli is golden pollinose; below the second swelling there is a rather broad band of silvery pollen. First two antennal joints very short; the third very large, subquadrate, and brownish yellow; arista black. Face narrowing towards oral margin; a prominent tubercle present which is of a shining violet reflection; between the antennae and the tubercle the face is excavated and covered with silvery pollen; epistoma not projecting.

Mesonotum with violet, bronzy, greenish, blue and coppery reflections, and with three distinct longitudinal vittae of a coppery cast. Scutellum inflated, bright golden yellow, and without distinct punctures except the anterior corners which are greenish black and punctate. Pleurae bluish with a coppery reflection.

Abdomen dark greenish blue basally, becoming lighter on posterior half and with a shining golden tip. Second segment with prominent, outwardly directed horn on each anterior corner. Abdomen marginate and with a downward projecting obtuse tooth on each of the under posterior corners. Under side of abdomen excavated.

Legs greenish black, knees more or less brownish, hind tibiae on the exterior side at the tip with a broad excavation.

Wings smoky; the stigmatical spot black; a broad blackish spot below the stigma, another spot present on the crossvein connecting the discal and anal cells, and also a broad preapical spot present.[1] Plumula vestigial; squamae, cilia and halteres yellowish.

Length: about 9.5 mm.; wing 8.5 mm.

---

[1] The markings on the wings are not shown in the figure.

Described from four females, Rio Charape, Peru, September 16; C. H. T. Townsend, collector.

Type.—Cat. No. 24097, U. S. N. M.

This species is at once distinguished from our North American species of *Nausigaster* by its larger size, more variegated color, and the presence of the horns on the second segment.

From *N. bonariensis* Lynch (Argentina) it may be distinguished by the different color, larger horns on the second segment, and non-appendiculated apical crossvein. In one specimen of the material at hand there is an adventitious vein between the first and second veins near their tips.

See discussion under Nausigasterinae for the remarkable resemblance members of this genus bear with the Chrysididae (Hymenoptera).

Nausigaster peruviensis n. sp.

Female.—Medium-sized species, general color aenescent. Ocellar callus reddish; frontal callus shining greenish black; a silvery pollinose band present between the two calli, and below there is a broad indefinite silvery pollinose band. Antennae brownish. Face narrowing towards mouth, tubercle reddish piceous; face, in profile, rather strongly retreating from the tubercle to the mouth margin.

Mesonotum of a general mahogany red, and with four pale, silvery pollinose, longitudinal vittae. Scutellum margined with a thin serrulated edge.

Anterior corners of second tergite with small conical horns; also a median triangular depression present on second tergite, the peak directed caudad. Otherwise abdomen is typical of the genus.

General color of the legs yellowish brown.

Wings: A deep brown stigmatical spot at tip of auxiliary vein; below a broad brownish spot extending to the fourth vein; a rather light spot present on crossvein connecting the discal and anal cells; a preapical spot extending from the first vein half way between the third and fourth veins.

One specimen, Santa Eulalia, Peru, Jan. 18, 1913; C. H. T. Townsend, collector.

Type.—Cat. No. 24098, U. S. N. M.

N. peruviensis is somewhat larger than our North American species of *Nausigaster*. Shape of head is very similar to *N. uni-*

maculata, and also the scutellum of each is very similar. However, the conical processes on the second tergite at once separate it from our North American species. It is distinguished from *N. chrysidiformis* by its smaller size, the smaller size of the abdominal horns, and the shape and color of the scutellum. This species may be closest related to *N. bonariensis* Lynch (Argentina). Lynch, in his description, only mentions the black stigmatical spot of wing, and it is assumed that this is the only spot on the wing. Also it is evident that his species is more piceous and rufous piceous than the present one. In his generic diagnosis, presumably based on his *bonariensis* material, Lynch states that the eyes are naked. This may hold true for his species, but in all of the species before me (five out of seven known species) the eyes are thinly pilose.

Cerioides tricolor Lw.

The species discussed below apparently comprises another subgenus of *Cerioides* and the name **Monoceromyia** is here proposed.

The following are the salient characters of *C.* (*Monoceromyia*) *tricolor:* Antennae inserted on a pedicle quite as long as length of antennae exclusive of style; abdomen strongly constricted basally; loop in third vein without adventitious branch; posterior margin of wings rather strongly chitinized, appearing as an ambient vein.

Color: Ocellar region black, bordered by yellow postorbital regions; face bright yellow with three reddish-brown stripes, two of them are lateral, the third median; humeri, prealar, and postalar spots bright yellow; scutellum yellow except for central blackish spot; a large yellow spot on pleurae and another one present on hypopleura; legs yellow, becoming somewhat reddish on tarsi; a blackish spot present at middle of posterior femora; anterior margin and corners of abdomen bright yellow; a large black median spot on first segment; remainder of abdomen reddish brown except for narrow yellow stripe on posterior margin of second segment. Anterior half of wing with deep brown cloud.

Monoceromyia tricolor **floridensis,** new variety, differs from *tricolor* in having the yellow markings more reddish and in the complete absence of the hypopleural spot.

An unique male, bearing only the label "Fla."

Type.—Cat. No. 24117, U. S. N. M.

This species is among the most handsome and distinctive of the genus and makes a welcome addition to our fauna. *Cerioides* (*Monoceromyia*) *tricolor* Lw. was originally described from Cuba and Hine records two specimens from Holguin, Cuba. Prof. Hine has very kindly loaned me the two specimens, females, upon which the above description is based. This favor aided considerably in the identification of the species and very probably saved me from making a synonym.

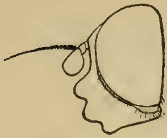
For the loan of these specimens and other material of this genus I wish to record here my sincere thanks to Prof. Hine.

Dr. J. Bequaert has also loaned me material in this group for which I wish to express my sincere appreciation.

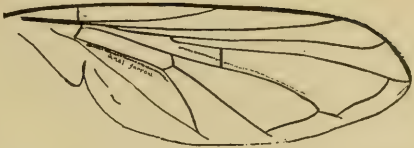
EXPLANATION OF PLATE.

FIG. 1. *Chilosia similis* Shannon, ♀: *a,* head in profile; *b,* venation of wing. FIG. 2. *Volucella pelluscens* Linnaeus (genotype): *a,* head in profile; *b,* venation of wing. FIG. 3. *Eristalis tenax* Linnaeus: *a,* head in profile; *b,* venation of wing. FIG. 4. *Xylota segnis* Linnaeus (genotype): *a,* head in profile; *b,* venation of wing. FIG. 5. *Nausigaster chrysidiformis* Shannon: *a,* head in profile; *b,* venation of wing.

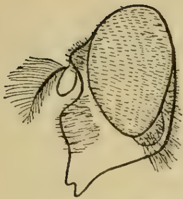
An unused taxonomic character in Syrphidae (Diptera).—In his paper on *Syrphidae,* in volume 16 of this magazine, R. C. Shannon separates *Eristaliinae* from *Chilosiinae* and *Xylotinae* by a combination of characters, but omits one character which appears to be of prime importance, though unmentioned in any paper on the family, and which evidently substantiates his present assignment of the genera concerned. This character consists of a dense patch of stubby decumbent black spinules at the bases of all the femora on their anterior surfaces. These are present on *all* femora only in *Eristaliinae,* so far as our material shows, though they may be present on at least the fore femora in some genera in other subfamilies.—J. R. MALLOCH, U. S. Biological Survey.



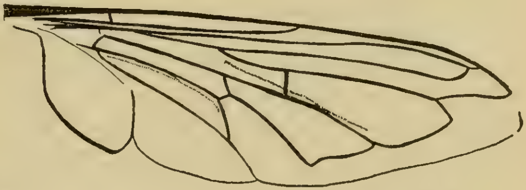
1a


Anal furrow

1b



2a



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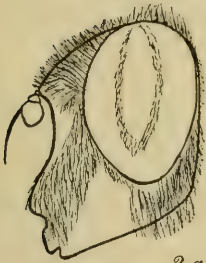

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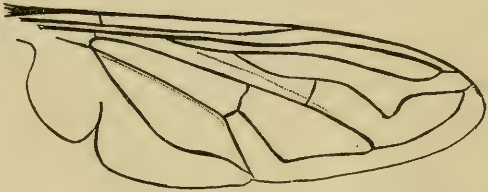

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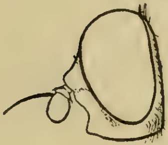
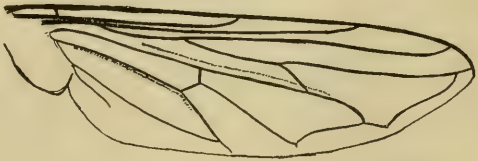


4a



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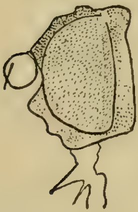
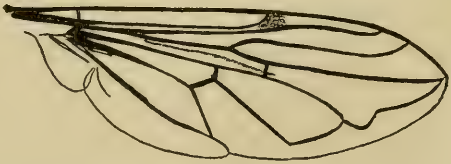


5a



5b

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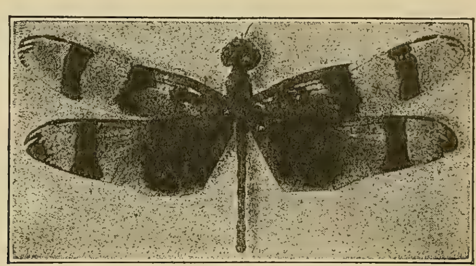

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BULLETIN

OF THE

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PUBLICATION COMMITTEE

J. R. de la TORRE-BUENO,
Editor

DR. J. BEQUAERT GEO. P. ENGELHARDT

Published by the Society

Price, 35 cents Subscription, $1.50 per year

Mailed August 12, 1922

Entered as second-class matter January 21, 1919, at the postoffice at Lancaster, Pa.,
under the Act of March 3, 1879

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CONTENTS

EDWARD LOUIS GRAEF, G. P. E. 43
NOTE ON RHODITES, Beutenmüller 45
PANORPA RUFESCENS FEEDING ON CICADA, Malloch 45
GENITALIA OF MALES OF HEMIPTERA, Crampton 46
NEW GENUS AND SPECIES OF NOCTUIDAE, Barnes and Lindsey 56
CRANE FLIES OF NEW YORK, Alexander 58
COLOR CHARACTERS VS. STRUCTURAL CHARACTERS, J. R. T. B. 63
SALDOIDA SLOSSONI, n. var. Hungerford 64
PLATYPSYLLUS CASTORIS IN COLORADO, Cockerell 64
CYRTOPELTIS IN NORTH AMERICA, Knight 65

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February, April, June, October and December of each year

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11 North Broadway, White Plains, N. Y.

BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

VOL. XVII APRIL, 1922 NO. 2

EDWARD LOUIS GRAEF.

Mr. Edward Louis Graef, a pioneer member of the Brooklyn Entomological Society, died in his eightieth year on February 15th, at Bay Shore, Long Island, N. Y.

Mr. Graef, born at Aix-la-Chapelle, Germany, came to the United States in 1848 with his parents and five brothers and sisters, settling in what was known then as "Yellow Hook," now Bay Ridge, Brooklyn, where his father, Henry A. Graef, established himself as a florist. He also was interested in Natural History and made a collection of local plants.

Stimulated by the paternal example, Edward, early in life, developed a similar taste and while attending Prof. Joseph Deghuée's school, 1853 to 1858, he formed an intimate friendship with two school-fellows, Frederick Tepper and Augustus Radcliffe Grote, and combined with them in making insect collections. This association continued for many years.

Like most of the Brooklyn entomologists of that time, Mr. Graef confined his interest to the Lepidoptera, of which he acquired a very extensive collection, notably from this continent but representative also of other countries.

Of his trials and tribulations in starting a collection Mr. Graef tells in an article, "Some Early Brooklyn Entomologists," BULLETIN, Vol. IX, No. 3, 1914.

One of the chief difficulties in those days was to get specimens named and this led to a helpful acquaintance with men like Ackhurst, Calverly, W. H. Edwards, Weidenmeyer, Strecker, Lintner, Morris, Morrison, Andrews and others. He loved to talk about these men and his reminiscences of some of them were most entertaining. Another cherished recollection of Mr. Graef was his warm friendship with Prof. Franz G. Schaupp, who introduced him to a large number of real or supposed collectors dwelling in a part of Brooklyn known as the "Eastern District," then settled chiefly by Germans. This brought about the organization of the Brooklyn Entomological Society, which held its first meeting in Professor Schaupp's rooms in 1876, when Schaupp was elected President and Graef Treasurer. Subsequently, Mr. Graef served the Society for several terms as President and in later years and up to the time of his death as Honorary President.

Most of his good friends and fellow members of the early days, among them Neumoegen, John B. Smith, Hulst, Koebele and Roberts, have preceded Mr. Graef into the Great Beyond, but by all who knew him, whether old or young, he will be remembered as a kind and jovial man, always ready to cheer and to help where assistance was needed.

Mr. Graef established and carried on the business of an importer of wines at 58 Court Street, Brooklyn, for fifty years. In 1900, when increasing responsibilities prevented him from continuing his favorite study, he very generously presented his entire collection comprising some 10,000 specimens and about 80 types to the Brooklyn Museum. Many of the types are based on Mr. Graef's own descriptions, published in early volumes of the BULLETIN. In recognition of this valuable gift he was appointed Honorary Curator of Lepidoptera of the Brooklyn Museum and elected a Patron of the Brooklyn Institute of Arts and Sciences.

Mr. Graef is survived by his wife, Mrs. Minnie Witte Graef, residing at Bay Shore, Long Island, and by three married daughters and seven grandchildren.

G. P. E.

Note on Rhodites.—The *Rhodites* determined and described by D. Fullaway as *R. bicolor* from California (Ann. Ent. Soc. Amer., IV: 377, 1911) is not the same as our Eastern *R. bicolor* and should be renamed. I propose for it *R. occidentalis.* I have a male and female from Fullaway's material and bred a number of specimens from galls collected by Dr. Isabel McCracken.—WM. BEUTENMULLER.

Panorpa rufescens feeding on a Cicada (Neuroptera).—On July 31, 1921, while collecting insects at Cabin John, Md., my attention was attracted to a specimen of *Cicada tibicen* G. & S. which was lying among some long grass and weeds below the trees. On close examination I discovered three or four specimens of *Panorpa rufescens* Ramb. apparently feeding upon the surface of the *Cicada,* especially along the ventral abdominal sutures. I captured one female of the *Panorpa* and took the *Cicada,* which upon examination proved to have been but a short time dead and was not injured extensively, though there was a small hole one side of the abdomen at the tip that may have been made by a bird. Probably the insect was killed by a bird and dropped where the panorpids found it. I have often seen the species of *Panorpa* feeding on the nectar of flowers, but this is the first time I have found them feeding on an insect, though they probably do so often like the genus *Bittacus.*—J. R. MALLOCH, U. S. Biological Survey.

THE GENITALIA OF THE MALES OF CERTAIN HEMIPTERA (HETEROPTERA) AND HOMOPTERA.

By G. C. Crampton, Ph.D.

(Massachusetts Agricultural College, Amherst, Mass.)

The present paper is offered as a preliminary note embodying an attempt to apply to male Hemiptera (Heteroptera) and Homoptera the terminology worked out for the genitalia of insects in general in previous papers dealing with this subject (Crampton, 1918–1920). Only a few typical forms in each group have been discussed at this time, since I am hoping to treat of these groups more extensively in a future publication. For the heteropterous material used in this investigation I am indebted to Dr. H. M. Parshley; and Professor Z. P. Metcalf and Mr. W. T. Davis have very kindly identified the Homoptera here figured. To these gentlemen I would express my very sincere appreciation of the information and assistance they have so freely given.

The following terminology of the parts of the terminal abdominal structures of male insects in general has been applied to the Hemiptera and Homoptera in the following paper. Packard, 1898, calls the abdominal segments *uromeres,* and the ninth *uromere,* which is the segment particularly associated with the genital apparatus of the male, has been termed the *gonomere* to indicate that it is the genital uromere "*par excellence*" in this sex. The terminal abdominal segments, including the segment bearing the anus, are called the *opisthomeres* by Verhoeff and other students of the Dermaptera. The ninth (or in some cases the eighth) sternite, beneath the genital apparatus of the male, is called the *hypandrium.* The cumbersome half-English, half-Latin designation "subgenital plate" or "subgenital valve" is sometimes applied to this structure in the male, but it is preferable to use a designation which would be the same in any language, as is the case with the term hypandrium. The hypandrium is occasionally produced posteriorly in two valve-like processes called the *hypovalvae.* The hypandrium also bears a pair of *styli* homologous with the exopodites of a pair of abdominal limbs whose coxae have united with the hypandrium or sternite which bore them. The styli which form the genital claspers of the male have been termed *gonostyli* (or *gonopods*) to distinguish them from the other abdominal styli (in such insects as *Lepisma Machilis,* etc.) which are not associated with the genital structures. A "connective" extends from the base of the gonopods to the base of the aedeagus in some forms. The intromittent organ of the male is called the *aedeagus.* It is usually made up of the united penis valves (penisvalvae) and may be further complicated by the outgrowth of numerous secondary structures. The aedeagus contains the *penis,* which may be membranous, or it may bear various outgrowths and formations of a chitinous nature. The homologues of these structures in the hemipteroid insects (Hemiptera and Homoptera) may be described as follows:

The GONOMERE or genital uromere of the male is formed by the homologue of the ninth uromere; but it is not always evident that the ninth uromere is the one involved, since the basal abdominal segments are sometimes atrophied, or they may unite to some extent, making it difficult to detect them in the adult stages. The gonomere bears the label "9" in the appended figures (Plate 13). It is sometimes called the "pygofers" (or "rump-bearers") by homopterists, while the dipterists call it the "hypopygium" (or "under-the-rump"), and students of other groups have applied various terms to it; but it is preferable to retain the designation gonomere, or genital segment, for the structure in question, since it is *the* genital segment of the male insect in the Hemiptera as well as in other insects.

The OPISTHOMERES bear the labels 10 and 11 in Figs. 12, 13, etc., and represent the tenth and eleventh uromeres which bear the telson—the representative of the twelfth abdominal segment. The tenth uromere (labeled *pg* in Figs. 2, 4, 5, 6, 7, 8, 10, etc.) is usually better developed than the others, which are usually telescoped within it; and since the tenth uromere is the apparent carrier of the anus, it has been termed the *proctiger.*

The PROCTIGER, or tenth uromere, within which the other terminal uromeres are telescoped, is long and slender in the insect shown in Fig. 6, *pg;* and in the insect shown in Fig. 5 it bears a shallow trench or groove *as* called the *anosulcus,* which serves to conduct off the material discharged from the anus. In the cicada shown in

Fig. 9 the tenth uromere is produced posteriorly over the intromittent organ *ae,* and its position suggests that it may correspond to the structures called the *tegumen* and *uncus* in Lepidoptera, although the tenth uromere never has the form of a tegumen and uncus in the lower insects, and is always the apparent bearer of the anal papilla. The tenth uromere of the cicada shown in Fig. 9 bears a pair of hook-like structures (one on either side of the intromittent organ *ae*) which were termed the *surgonopods, sg,* in other insects, from their position above the gonopods or clasping organs. It is possible that the structures labeled *sg* in Fig. 9 may represent the fused structures called the *scaphium* (from a fancied resemblance to a shovel or skiff) in Lepidoptera, but the surgonopods are not united in the cicadas and other related forms. I have not been able to procure the material necessary to enable me to homologize the parts of a cicada with those of the Lepidoptera, but from an examination of the material available it would appear that the structure of the terminal appendages of the male would bear out the evidence of a rather close relationship between the hemipteroids and Lepidoptera indicated by the wing venation, and a comparison of the genitalia in the two groups should be productive of interesting results. The structures labeled *sg* in Figs. 12 and 13 apparently represent the surgonopods *sg* of the cicada shown in Fig. 9, and if this be correct, it would indicate that the surgonopods arise as processes of the pleural region of the tenth uromere, possibly homodynamous (*i.e.,* serially homologous) with the pleural processes labeled *pp* borne on the ninth uromere of the insect shown in Fig. 13. It is also possible that the structures labeled *sg* in Figs. 9 and 13 may represent the cerci, but it is more probable that the interpretation indicated by the labels is the correct one. The lips of the anal opening, or *anolabii,* labeled *al* in Figs. 2, 5, 6, etc., project from the proctiger *pg,* and the telson, or the united eleventh uromere and telson, may protrude as an *anopapilla,* or anal papilla *ap,* as in the insects shown in Figs. 9 and 11.

The HYPANDRIUM or sternite beneath the genital apparatus of the male insect may occur as a distinct plate such as the one labeled *ha* in Figs. 1 and 9, or it may be indistinguishably united with the pleural region of the ninth uromere. In the insect shown in Fig. 3

a pair of posterior lobes *hv* are beginning to form in the hinder region of the hypandrium *ha,* and in the insect shown in Fig. 13 (compare also Figs. 17 and 18) these lobes have assumed the form of the hypovalvae *hv* or hypandrial valves. In the insect shown in Fig. 12 these valves become proportionately longer, and in the insect shown in Fig. 25 the hypovalvae *hv* are demarked from the remainder of the hypandrium *ha* by a faint suture. In the insects shown in Figs. 22 and 26 these valves *hv* have developed an articulation with the remainder of the hypandrium *ha,* and during copulation they fit on either side of the hypogynium or subgenital valve *hg* of the female insect as is shown in Fig. 26. The hypandrial valves *hv* of the insects shown in Figs. 22 and 26 are very similar in position, structure, and function to the valvular structures bearing the label *"s?"* in Figs. 2, 5, 6, 7, etc., but I have been unable, as yet, to obtain suitable material to enable me to determine definitely whether these two types of structures are homologous or not. The hypandrium *ha* is produced laterally to form wing-like expansions, the *parandria, pa,* one on either side of the genital apparatus of the male Hemipteron shown in Fig. 19, and the hypandrium (or rather the gonomere) forms a terminal chamber, in which the genital apparatus is borne, in the insect there figured. In the insect shown in Fig. 21 the floor of the terminal chamber bears a median ventral process *hp,* the *hypoprocessus,* which apparently serves to direct the intromittent organ in mating. In the insect shown in Fig. 16 the hypandrium is produced posteriorly to form a more or less vertical, prow-like structure *pu,* called the *puppis* in Plecoptera and other lower insects, and there are many other features of the Hemiptera which suggest that they, with the Psocida and Zoraptera, were ultimately derived from ancestors resembling the Plecoptera.

The STYLI or gonostyli *s* are borne on the posterior margin of the hypandrium *ha* of the roach shown in Fig. 20, and in the Hemipteron shown in Fig. 24, the styli or gonostyles, *s,* occupy the typical position on the posterior margin of the hypandrium *ha,* as in the roaches. The gonostyles, *s,* of the mirid shown in Fig. 24 are asymmetrically developed and bear curious outgrowths, or "prongs," suggestive of the condition occurring in certain roaches as well. In the Hemipteron shown in Fig. 23 the gonostyles, *s*, have become located further forward and more dorsally than in the insect shown in Fig. 24, while in the insect shown in Fig. 19 the gonostyles, *s*, come to lie within the so-called terminal chamber, formed by the genital segment. In the insect shown in Fig. 25 the homologues of the styli, *s*, are small and insignificant, but in the related form shown in Fig. 22 the styli, *s*, are well developed, as is true of the insects shown in Figs. 12, 13, etc. I have provisionally adopted the view that the valves labeled "*s*?" in Figs. 2, 5, 6, 7, 10, etc., represent the styli, *s*, of the insects shown in Figs. 12, 13, etc.; but it is quite possible that the structures labeled "*s*?" in Figs. 2, 5, 6, 7, 10, etc., may represent the hypandrial valves *hv* of Figs. 12, 13, 22, etc., instead, and I am inclined to accept the latter view as the more probable one. If the valve labeled "*s*?" in Fig. 7 should prove to be the representative of the hypandrial valve *hv* of Figs. 12, 22, etc., the structure labeled *bs* in Fig. 7 might be the representative of the styli, *s*, of the other forms (Figs. 12, 13, etc.), but the structure labeled *bs* in Fig. 7 would appear to be merely an outgrowth of the valve labeled "*s*?". It should be borne in mind that there can never be more than one pair of true styli borne on the sternite of a single segment, since the styli are the exopodites of a pair of limbs borne on the sternite of an abdominal segment, and there are never more than one pair of limbs borne on a single segment. The varied size and shape of the claspers "*s*?" of Figs. 2, 5, 6, etc., make them valuable structures in classification.

The GONOPLEURITES or pleural regions of the genital segment, which are labeled *gp* in Figs. 22, 25, 26, etc., are produced posteriorly to form the gonopleural lobes, or secondary clasper-like organs of the males in these insects. As is indicated in Fig. 26, these gonopleural lobes fit over the plate at the base of the ovipositor of the female, and doubtless aid in maintaining the parts in a suitable position during mating. The gonopleural lobes of the insects shown in Figs. 25, 22, etc., are apparently portions of the pleural region of the ninth uromere, but they are slightly different from the *pleuroprocessi*, *pp*, or pleural processes of the ninth uromere of the insect shown in Fig. 13. The pleural processes *pp* of the ninth uromere of the insect shown in Fig. 13 are apparently serially homologous with the pleural processes *sg* of the tenth uromere of this insect, and it is possible that the pleural processes *sg* of the tenth uromere of the insect shown in Fig. 13 may unite to form the backward-projecting portion of the tenth uromere *pg* of the insect shown in Fig. 5.

The AEDEAGUS or intromittent organ of the male is borne on the ninth uromere, and is possibly formed by the united penis valves (or by a modified penis valve) of lower insects. In a former paper (Crampton, 1920B) it was suggested that the penis valves may represent the endopodites of abdominal limbs (of the ninth uromere) whose exopodites form the genital styli. In the insect shown in Fig. 14 the aedeagus *ae* is chitinized in such a way as to give the impression that it is composed of a series of segments, and it is possible that the telescoping of these segment-like structures, one into the other, may give rise to the complicated arrangement of the aedeagus in certain insects, although the secondary formation of chitinous outgrowths, etc., have brought about this condition in other instances. In the insect shown in Fig. 4 the terminal portion of the aedeagus, called the *telaedeagus ta* in other insects, takes on the character of an articulated appendage, apparently homologous with the more ornate structure labeled *ta* in Fig. 6. The aedeagus of the insect shown in Fig. 5 bears a pair of hook-like spines, the *aedeagohami, ah,* which may be homologous with the similarly located structures labeled *ah* in Fig. 2; while the claw-like *aedeagounci, au,* of Fig. 5 may possibly be homologous with the slender structures labeled *au* in Fig. 2. It is very difficult to homologize all of the intricate, secondarily developed structures of the intromittent organ in the different types of hemipteroid insects, however, and the interpretation of these parts can be better taken up when suitable material for tracing their modifications in the various groups is available.

The PENIS is usually a retractile organ, and in most hemipteroid insects it is not protruded from the aedeagus excepting under sexual stimulus. The ejaculatory duct opens through the penis, and in such forms as the Dermaptera the terminal portion of the ejaculatory ducts may become chitinized to form the so-called virga. Various chitinizations of the integument and secondarily formed projections serve to complicate the structure of the penis; and in some instances, as in Fig. 15, it is very difficult to determine the purpose and "*modus operandi*" of certain of the curious copulatory accessories developed in this region.

It is not my purpose to discuss the relationships indicated by the terminal abdominal structures of the male insects at this time, since it is necessary to make a study of various intermediate forms not at present available before such an investigation can be satisfactorily carried out. I would call attention to certain features, however, which are readily apparent from the material at hand, and which lend additional weight to evidences of relationship drawn from other sources. The terminal structures of certain of the Hemiptera (Heteroptera) are of a very primitive type, and apparently have been retained from an ancestral condition suggestive of an origin in forms resembling the Plecoptera. This is in full accord with the evidence drawn from other sources, indicating that the Hemiptera, Psocida, and Zoraptera were eventually derived from ancestors resembling the Plecoptera in many respects—although the Plecoptera do not represent the actual ancestors of these forms. In some respects the Hemiptera (Heteroptera) have retained a more primitive condition than the Homoptera have with regard to certain of the terminal structures; but, in general, the Homoptera are more primitively organized than the Hemiptera (Heteroptera). As I am hoping to show in another paper dealing with this subject, the terminal structures of certain Hemiptera are extremely similar to those of certain Psocida, thus bearing out the conclusion drawn from the study of other structures which would indicate that the ancestors of the Hemiptera and those of the Psocida were very similar in many respects—although the Psocida can not be regarded as the actual ancestors of the Hemiptera. There are many features of the terminal structures of male Hemiptera which suggest affinities with the Blattida (*sensu lato*), and the character of certain other features, such as the wings, etc., would indicate that an investigation of this matter further may lead to interesting results in determining the nature of the forms ancestral to the Hemiptera, Psocida, Zoraptera, etc. Furthermore, a comparison of the genitalia of male hemipteroid insects with those of male Lepidoptera indicates that there is a marked similarity in these structures in both groups, so that the pronounced resemblance between the wings of certain Homoptera and the Lepidoptera may not be wholly due to convergence, and a study of Homopteron anatomy may throw considerable light upon the question of the nature of the ancestors of the Lepidoptera (which would also involve a study of the Psocida in this connection).

The genital and terminal structures of a cicada (Fig. 9) are not as primitive as one would expect from the fact that the cicadas are placed among the lowest of the Homoptera. In fact, the terminal segments of a cicadellid (jassid), such as the one shown in Fig. 13, have remained in a more primitive condition than is true of the average cicada, and the membracid shown in Fig. 1 is more primitive in this respect than the cicada shown in Fig. 9. The membracids resemble the cicadas in having a distinct hypandrium *ha* (Figs. 1 and 9), but in other features the membracids do not resemble the cicadas as much as one would expect from evidence of relationship furnished by structures other than the terminal abdominal ones. The cercopid shown in Fig. 3 has much in common with the membracids such as the one shown in Fig. 1, but the resemblance between the two groups is not very striking. The psyllids (Fig. 4) appear to be as near the fulgoroids (Fig. 6) as any other Homoptera, so far as their terminal abdominal structures are concerned; but it is necessary to take into consideration a far wider series of forms than those here figured in attempting to determine the interrelationships of the different hemipteroid groups, and this phase of the subject will therefore be left to be taken up in the more detailed discussion of the genitalia and terminal abdominal structures of male hemipteroid insects, which I am hoping to present in a subsequent paper.

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ABBREVIATIONS.

ae	Aedeagus, or intromittent organ.
ah	Aedeagohami, or hami of the aedeagus.
al	Anolabii, or lips of the anus.
ap	Anopapilla, or anal papilla.
as	Anosulcus, or anal groove.
au	Aedeagounci, or unci of aedeagus.
bs	Basal process of clasper.
gp	Gonopleurite, or pleurite of genital segment.
ha	Hypandrium, or sternite below genitalia of male.
hp	Hypoprocessus, or process of sternal region.
hv	Hypovalvae, or hypandrial valves.
pa	Parandria, or lateral processes of hypandrium.
pg	Proctiger, or structure bearing anal papilla.
pp	Pleuroprocessus, or pleural process.
pu	Puppis.
s	Styli, or gonostyles.
s?	Claspers homologous with styli, or hypandrial valves.
sg	Surgonopods (cerci ?).
ta	Telaedeagus, or terminal appendage of aedeagus.

EXPLANATION OF PLATES.

FIG. 1. Lateral view of genitalia and terminal structures of membracid Homopteron *Stictocephala lutea* Walk.
FIG. 2. Same of fulgorid Homopteron *Ricania speculum* Walk.
FIG. 3. Same of cercopid Homopteron *Clastoptera obtusa* Say.
FIG. 4. Same of psyllid Homopteron.
FIG. 5. Same of fulgorid Homopteron *Ormenis pruinosa.*
FIG. 6. Same of fulgorid Homopteron *Otiocerus degeeri* Kirby.
FIG. 7. Same of fulgorid Homopteron *Poblicia fuliginosa* Oliv.
FIG. 8. Same of cicadellid Homopteron *Jassus olitorius* Say.*
FIG. 9. Same of cicada *Melampsalta calliope* Walker.
FIG. 10. Same of the fulgorid *Cixius coleopum* Fitch.
FIG. 11. Same of Mecopteron *Panorpa nebulosa.*
FIG. 12. Same of cercopid Homopteron *Aphrophora quadrinotata* Say.
FIG. 13. Same of cercopid nymph.
FIG. 14. Same of gerrid Hemipteron *Gerris conformis* (with penis exserted).
FIG. 15. Accessory apparatus of penis of coreid Hemipteron *Chelinidea vittiger* Uhl.
FIG. 16. Lateral view of genitalia and terminal structures of reduviid Hemipteron *Zelus cervicalis* Stal.
FIG. 17. Dorsal view of terminal structures of saldid Hemipteron *Pentacora ligata* Say.
FIG. 18. Ventral view of tip of ninth abdominal sternite of same.
FIG. 19. Dorsal view of genitalia and terminal structures of pentatomid Hemipteron *Brochymena 4-pustulata* Fabr.
FIG. 20. Ventral view of ninth abdominal sternite of the roach *Ischnoptera.*
FIG. 21. Dorsal view of styli and proctiger of pentatomid Hemipteron *Tessaratoma.*
FIG. 22. Lateral view of genitalia and terminal structures of cicadellid Homopteron *Gypona octolineata* Say.
FIG. 23. Dorsal view of genitalia and terminal structures of coreid Hemipteron *Alydus pilosulus* H.-S.
FIG. 24. Ventral view of ninth abdominal sternite of mirid Hemipteron *Lopidea.*
FIG. 25. Lateral view of terminal abdominal structures of cicadellid Homopteron *Graphocephala coccinea* Foerst.
FIG. 26. Lateral view of terminal structures of male and female of the cicadellid Homopteron *Platymetopius acutus* Say.

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* This specimen looks like a female, but Professor Metcalf assures me that all the Homoptera figured here are males.

A NEW GENUS AND SPECIES OF NOCTUIDAE. (LEP.)

By Wm. Barnes, M.D., and A. W. Lindsey, Ph.D., Decatur, Ill.

Hyperepia n. gen.

Proboscis fully developed. Palpi oblique, moderate; second joint deeply scaled, third very small. Front smooth, not prominent Eyes large, rounded. Antennae of male pectinate to near tip, the branches moderately long, of female simple, ciliate. Head and thorax clothed with long-stemmed scales, broadened and once or twice cleft at tips. Pro- and metathorax with spreading tufts. Abdomen with a dorsal crest on first segment. Primaries rather short and broad, much as in *Epia,* with a prominent, acutely rounded apex. Neuration as in *Epia:* primaries with Cu_1 and M_2 near angle of cell, M_1 near upper angle; areole present, R_1 free, R_2 from areole, R_3 and R_4 stalked, connate with R_5 from apex of areole. Secondaries with M_3 and Cu_1, and R and M_1 from angles of cell; M_2 represented by a fold.

In Hampson's key to the genera of *Hadeninae* (*Cat. Lep. Phal. B. M.,* V) this genus runs to the category which includes *Hadena* (*Neuria* of B. & McD. Check List), but it differs from our one species, *procincta* Grt., in the complete absence of hairs from the thoracic vestiture and the less oblique outer margin of the primaries. In general habitus it is nearer to *Epia,* whence we derive the name, but it differs from that genus in the absence of a frontal prominence, absence of claw-like spines from the front tarsi, and several other particulars. Type:

Hyperepia pi n. sp.

Head, thorax and abdomen clothed with brownish clay-yellow scales, those on the thorax banded with gray-brown and tipped with whitish. Collar with two inconspicuous gray-brown lines.

Primaries dark brown, basal area slightly paler and subterminal area tinged with mauve in fresh specimens, clay-yellow in older examples. All lines geminate. Basal line extending from costa to anal vein, inner line blackish. T. a. line oblique, outwardly angled on the subcostal and bent basad at the inner margin, its outer line blackish; marked on costa by two blackish dots. Median shade marked on costa by a blackish dot. T. P. marked on costa by two blackish dots, thence running outward parallel to costa, bending around end of cell, where it is almost straight, and turning inward on M_2, whence it is slightly concave to A_1, where it turns outward to inner margin. Inner line marked with a few blackish scales, lost in the brown median area, outer more grayish. S. t. line formed of a brown shade followed by a lighter brown line, which is in turn followed by a few velvety black spots in the brown terminal area. This line has an outward curve below the cell, but is otherwise rather even. There is a terminal scalloped blackish line, heaviest in the sinuses between the veins. Fringes pale tawny, cut at the veins with gray-brown and tipped with the same color. The spots are clay-yellow, sometimes including a brown ring. Orbicular ovate, oblique; reniform elongate, sometimes almost crescentic, connected with orbicular by a broad band of similar color along inner margin of cell. This band extends basad of the orbicular in an acute point, and contains a white line along the cubital stem. Its form in the holotype, together with the orbicular and reniform, suggests an inverted Greek letter *pi* (π), whence we derive the name. The tip of the claviform is indicated by a blackish outline below the orbicular. Secondaries dull clay-yellow, suffused in the outer half and along the veins in the male and throughout in the female, with gray-brown. Fringes clay-yellow with an incomplete basal row of gray-brown scales. Under surface of primaries gray-brown with some clay-yellow scales on costa. Secondaries clay-yellow, sprinkled with gray-brown and with a broad terminal band and slender discal line of the same color. Expanse 28–30 mm.

Described from three specimens taken at High Rolls, Otero Co., N. M., in August. Holotype ♂ and allotype in coll. Barnes. Paratype in the collection of Mr. Fred Marloff, Pittsburgh, Pa. We have also a male from Truckee, Calif., which is more brownish in the subterminal space of the primaries, entirely lacking the mauve shade, but this appears to be due to fading.

Note.—The correct mailing date for No. 1 this volume of the BULLETIN is June 21, 1922.

THE CRANE-FLIES OF NEW YORK: FIRST SUPPLEMENTARY LIST.

By Charles P. Alexander, Amherst, Mass.

Under the general title of "The Crane-flies of New York," the writer has published two papers, the first[1] dealing with the distribution and taxonomy, the second[2] with the biology and phylogeny of these flies. Since the appearance of the general list of species,[1] in which 267 species were enumerated as occurring in New York, ten additional species have been found which are recorded in this paper. This additional list is made possible by the kind interest of several of the entomologists of New York City, chief of whom are Dr. Joseph Bequaert, Mr. William T. Davis, Mr. Howard Notman and Mr. Charles Schaeffer. To all these gentlemen and others mentioned in this paper, the writer expresses his deep gratitude.

The additions to the list of New York Crane-flies are as follows:

268. *Dicranomyia adirondacensis,* sp. n. (Described in this paper.)
    Essex County: Keene Valley, September 13, 1920 (Howard Notman).
269. *Tricyphona macateei* Alexander. (Can. Ent., Vol. 51, p. 166; 1919.)
    Suffolk County: Wyandanch, May 5, 1911 (W. T. Davis).
270. *Ormosia adirondacensis* Alexander. (Ins. Inscit. Menst., Vol. 7, pp. 145, 146; 1919.)
    Fulton County: Mountain Lake, June 17, 1914; Woodworth's Lake, June 17, 1916; Gloversville, June 22, 1916 (Alexander); *T. L.*
271. *Ormosia dentifera* Alexander. (Ins. Inscit. Menst., Vol. 7, pp. 144, 145; 1919.)

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[1] "The Crane-flies of New York, Part I, Distribution and Taxonomy of the Adult Flies," Cornell Univ. Agr. Expt. Sta., Mem. 25, pp. 767–993; June, 1919 (issued October, 1919).

[2] The same, Part II, "Biology and Phylogeny," Cornell Univ. Agr. Expt. Sta., Mem. 38, pp. 692–1133; June, 1920 (issued July, 1921).

Essex County: Keene Valley, May 29, 1920 (Howard Notman).

272. *Ormosia notmani* Alexander. (Can. Ent., Vol. 52, p. 255; 1920.)
Essex County: Keene Valley, May 26, 1920 (Howard Notman); *T. L.*

273. *Cylindrotoma americana* Osten Sacken.
Essex County: Mt. Marcy, altitude 4,000–5,000 feet, July 24, 1920 (Howard Notman).

274. *Nephrotoma euceroides* Alexander. (Can. Ent., Vol. 51, p. 172; 1919.)
Fulton County: Sport Island, Sacandaga River, June 16, 1910 (Alexander).

275. *Tipula annulicornis* Say.
Suffolk County: Riverhead, July 19, 1918 (Wm. T. Davis) (♀, *jejuna* Johnson).

276. *Tipula manahatta* Alexander. (Can. Ent., Vol. 51, pp. 169, 170; 1919.)
Suffolk County: Yaphank, September 3–4 (Charles Schaeffer); *T. L.*

277. *Tipula noveboracensis* Alexander. (Can. Ent., Vol. 51, pp. 167, 168; 1919.)
Essex County: Keene Valley, May 26–29, 1920 (Howard Notman).
Fulton County: Gloversville, June 24, 1916 (Alexander); *T. L.*
Albany County: Thachers Park, May 29, 1920 (Sherman C. Bishop).
Tompkins County: Ithaca, May 24, 1898; May 12, 1915 (Alexander).

In the above list, references to species are given only when they do not occur in the main list; as before the initials *T. L.* indicate the Type Locality for the species.

Besides the ten species just recorded that are entirely new to the New York list, a number of very interesting records of other species have come to hand. In order to make certain of these records available to the proposed Adirondack List, the species taken by Mr. Notman in Essex County are here recorded:

KEENE VALLEY, ESSEX COUNTY (HOWARD NOTMAN).

Bittacomorpha clavipes (Westwood); May 28, 1920.
Dicranomyia adirondacensis, sp. n.; September 13, 1920.
D. liberta O. S.; June 19–August 12, 1920; at light.
D. immodesta O. S.; September 13, 1920; at light.
D. simulans (Walk.); August 19, 1920; at light.
D. macateei Alex.; June 28, 1920.
Limnobia triocellata O. S.; August 4, 1920.
L. solitaria O. S.; June 3, 1920.
L. immatura O. S.; June 11, 1920.
L. cinctipes Say; June 3, 1920.
L. indigena O. S.; June 9–August 9, 1920; at light.
Rhipidia fidelis O. S.; August 6, 1920; at light.
R. maculata Mg.; September 13, 1920; at light.
Discobola argus (Say); October 1, 1920.
Antocha saxicola O. S. (*opalizans* form); August 13, 1920; at light.
Dicranoptycha germana O. S.; August 6, 1920; at light.
Ula paupera O. S.; June 6, 1920.
Epiphragma fascipennis (Say); May 30, 1920.
Dactylolabis montana (O. S.); June 4–6, 1920.
Limnophila brevifurca O. S.; May 26, 1920.
L. fratria O. S.; July 26, 1920.
L. (*Ephelia*) *aprilina* O. S.; May 26, 1920.
L. (*Prionolabis*) *rufibasis* O. S.; May 30, 1920.
Pilaria tenuipes (Say); August 12, 1920; at light.
Pedicia contermina Walk.; May 25, 1920.
Tricyphona inconstans (O. S.); May 29, 1920.
T. autumnalis Alex.; July 27, 1920; at light.
T. vernalis (O. S.); May 29, 1920.
Dicranota noveboracensis Alex.; May 26, 1920.
Molophilus pubipennis (O. S.); August 11, 1920; at light.
Erioptera (*Erioptera*) *septemtrionis* O. S.; August 7–16, 1920; at light.
E. (*Empeda*) *stigmatica* (O. S.); August 4, 1920.
Ormosia nubila (O. S.); August 25–September 6, 1920; at light.
O. nigripila (O. S.); June 4, 1920.
O. meigeni (O. S.); June 3–4, 1920.
O. notmani Alex.; May 26, 1920.
O. dentifera Alex.; May 29, 1920.
Gonomyia mathesoni Alex.; August 10, 1920; at light.
G. subcinerea O. S.; August 10, 1920; at light.
Cladura flavoferruginea O. S.; September 13–22, 1920; at light.

Liogma nodicornis (O. S.); June 14, 1920.
Oropeza venosa Johns.; June 22, 1920.
Dolichopeza americana Ndm.; June 16, 1920.
Tanyptera frontalis (O. S.); June 11, 1920.
Tipula nobilis (Lw.); June 17, 1920.
T. ultima Alex.; October 2, 1920.
T. angustipennis Lw.; May 26–June 11, 1920.
T. serta Lw.; June 4, 1920.
T. senega Alex.; June 9, 1920.
T. dejecta Walk.; May 26, 1920.
T. iroquois Alex.; May 26–June 9, 1920.
T. eluta Lw.; May 29, 1920.
T. noveboracensis Alex.; May 26–29, 1920.
T. sayi Alex.; August 9, 1920; at light.
T. cayuga Alex.; June 4, 1920.
T. apicalis Lw.; June 22–July 8, 1920.
T. fultonensis Alex.; May 30, 1920.
T. macrolabis Lw.; June 16–22, 1920.
T. submaculata Lw.; June 22, 1920.
T. parshleyi Alex.; June 12–19, 1920.
T. abdominalis (Say); June 9–August 2–7, 1920; at light.
Nephrotoma incurva (Lw.); June 22, 1920.
N. lugens (Lw.); May 30–June 4, 1920.
N. ferruginea (Fabr.); June 3–August 9, 1920.
N. tenuis (Lw.); June 7, 1920.
N. polymera (Lw.); June 19, 1920.
N. eucera (Lw.); June 7, 1920.

AUSABLE LAKE, ESSEX COUNTY (HOWARD NOTMAN).

Limnophila areolata O. S.; July 19, 1920.
Phalacrocera tipulina O. S.; July 30, 1920.

MT. MARCY, ESSEX COUNTY, ALTITUDE 4,000–5,000 FEET (HOWARD NOTMAN).

Limnophila areolata O. S.; July 25, 1920.
L. (*Prionolabis*) *munda* O. S.; July 24, 1920.
Tricyphona calcar (O. S.); July 21, 1920.
Erioptera (*Empeda*) *stigmatica* (O. S.); July 23–24, 1920.
Ormosia mesocera Alex.; July 21–24, 1920.
Cylindrotoma americana O. S.; July 24, 1920.
Dolichopeza americana Ndm.; July 23–24, 1920.
Tipula hermannia Alex.; July 24, 1920.

CLIFF MT., ESSEX COUNTY, ALTITUDE 3,500 FEET (HOWARD NOTMAN).

Dactylolabis montana (O. S.); July 27, 1920.

Dicranomyia adirondacensis n. sp.

General coloration dark brown with a microscopic gray pubescence that appears like a bloom; rostrum short, dark brown; antennae dark brown throughout; mesonotal praescutum dark brown medially; wings hyaline, stigma indistinct; *Sc* short, Sc_2 far from the tip of Sc_1; *Rs* short, angulated and spurred; cell *1st* M_2 closed.

Male.—Length about 4 mm.; wing, 4.3 mm.

Rostrum short, dark brown; palpi dark brown. Antennae dark brown throughout; flagellar segments oval. Head gray, the vertex between the eyes a little suffused with rufous.

Pronotum and mesonotum with the mid-dorsal region dark brown, the lateral portion densely covered with a yellowish gray, appressed, pubescence that resembles a pruinosity; remainder of mesonotum similarly colored. Pleura and mesosternum dark brown with a microscopic gray pubescence. Halteres of normal length, yellow, the knobs brown. Legs with the coxae concolorous with the pleura; trochanters obscure yellow; femora brown, paler basally; tibiae and tarsi dark brown. Wings hyaline, stigma indistinct; veins dark brown. Venation: Sc_1 ending far before the short sector, Sc_2 far from the tip of Sc_1, the latter alone being longer than the sector; *Rs* angulated and with a long spur just before midlength; *r* at tip of R_1, the basal section of R_{2+3} a little shorter than the deflection of R_{4+5}; inner end of cell *1st* M_2 distad of inner end of cell R_3; cell *1st* M_2 closed; basal deflection of Cu_1 just before the fork of *M*, a little longer than Cu_2.

Abdomen dark brown, the sternites scarcely paler. Male hypopygium with the pleurites comparatively small; ventral pleural appendage very large, much larger than the pleurites, the mesal face produced into a long rostrum that is directed strongly cephalad, near midlength with two stout spines. Gonapophyses with the caudal margin bearing a deep notch, the lateral angles being slightly produced into a shoulder; in *brevivena* the apophyses slope rapidly away from the apical point. *Habitat:* New York.

Holotype, ♂, Keene Valley, Essex County, September 13, 1920 (Howard Notman). Paratopotype, ♂.

Type in the writer's collection.

Dicranomyia adirondacensis is closely allied to *D. brevivena* O. S., differing in the coloration of the rostrum, the venation and slight details of structure of the hypopygium.

COLOR CHARACTERS VS. STRUCTURAL CHARACTERS.

To appreciate the profound difference in value as taxonomic characters between color as such and structure, one must be a hemipterist. The realization of difference and value reaches in these a peak of annoyed disgust.

Color in the Heteroptera is unstable, highly variable, frequently obscured, and in the aquatic forms practically the same throughout extensive groups; and a color description of one species will frequently cover entire genera and even groups. Color in this order is, in fact, purely secondary and useful only as a means to ready identification in certain well color-marked species.

This realization bears crushingly on anyone attempting to untangle the species of the older authors (and of some modern ones). Not one structural character not common to a group is mentioned, even though page-long and elaborate descriptions are given covering every minute change in color or pattern. The result is untold labor to control species, and always a haunting uncertainty.

Far too many entomologists, descriptive entomologists particularly, seem to apply the principles of lepidopterology to their several specialties—in fact, they are implicit lepidopterists dealing with other forms.

Color in Lepidoptera is, of course, largely structural, depending as it does on the form and arrangement of the scales. Many of their hues and shades are prismatic interference colors born of the scale structure. It is quite otherwise with insects of other orders, with few exceptions. In these coloration is due to true pigmentation, which is conditioned by food and climatological conditions, as well as by other factors, more or less difficult to appraise.

In descriptive biology, structure is, and should be universally recognized to be, the true and sole criterion of differentiation, for species are pure structural units, or they are nothing but words. Anthropology long years ago abandoned color as a differential character between races of men, and is now a hard and fast devotee to structure. The comparative anatomist depends absolutely on structure and structural homologies.

Descriptive entomology might perhaps be termed the differential anatomy of insects, for that is what it is essentially. To be upon an unassailable scientific basis it must resolutely adhere to structure as the only way of making absolute differentiations and of producing impregnable descriptions.

The undisciplined mind of some whimsical man might speculate on what would happen to an entomologist wedded to color who saw cats for the first time in his life. Every back yard would be populated with n. sp. galore, and, were they insects, a lifetime could be sweetly spent in describing them, for the curses of a graceless and ungrateful posterity.

Let's quit describing n. sp. of roaming felines.

J. R. T. B.

Saldoida slossoni Osb. var. wileyi, new var., taken in Texas.—I have received from my friend and pupil, Mrs. Grace Wiley, a female Saldid which she took along Big Sandy Creek, Eastland County, Texas, June 18, 1921. I am assigning it as a variety of Osborn's *S. slossoni*, which he described from a single female taken by Mrs. Annie Trumbull Slosson in Florida. This Texas specimen has the inflated scutellum of *S. slossoni*, but the divergent tubercles on pronotum of *S. cornuta* Osb. It lacks the black hands before and behind the prothoracic tubercles. It has a light fuscous, not black, scutellum, and the apex of the inflated tip is nearly black. The elytra are coriaceous, their apical two fifths shining black. Hind wings are absent. The presence of two raised rastrated patches on the scutellum and the presence of scattered erect hairs over head, thorax, and elytra may further separate this form from *Saldoida slossoni* Osb.—H. B. Hungerford, Lawrence, Kansas.

Platypsyllus castoris Ritsema in Colorado.—This remarkable parasitic beetle is recorded in Leng's *Catalogue* from Alaska, California, Dakota, and Texas. Mr. Ralph Hubbard, who is making an intensive study of the beaver in Colorado, recently brought in several specimens of *Platypsyllus* which he found in a beaver collected by Mr. Alfred Wheeler on South Boulder Creek, near Eldorado Springs, January, 1922.—T. D. A. Cockerell.

THE GENUS CYRTOPELTIS FIEBER IN NORTH AMERICA (HETEROPTERA—MIRIDAE).[1]

By Harry H. Knight, University of Minnesota, St. Paul.

Cyrtopeltis varians (Distant).

1876 *Engytatus geniculatus* Reuter, Öfv. Kongl. Sv. Vet.-Akad. Förh., XXXII, No. 9, p. 75 (name preoccupied).
1883 *Neoproba varians* Distant, Biol. Centr. Amer., Rhyn. Het., I, p. 271, pl. XXVI, fig. 7.
1894 *Engytatus geniculatus* Uhler, Proc. Zoöl. Soc. London, 1894, p. 193.
1909 *Cyrtopeltis varians* Reuter, Acta Soc. Sci. Fenn., XXXVI, No. 2, p. 62.
1910 *Engytatus* [*varians*] Reuter, Acta Soc. Sci. Fenn., XXXVII, No. 3, p. 151.
1917 *Dicyphus luridus* Gibson, Can. Ent., XLIX, p. 218.
1917 *Engytatus geniculatus* Van Duzee, Cat. Hemip., p. 371.

Specimens examined: Florida—2♀♀, Biscayne Bay (Mrs. A. T. Slosson). Texas—♂ Dec. 4, 1910, Mission (Hart). Nicaragua—♀, Managua (C. F. Baker). Porto Rico—2♂ Aug. 9, 1914, Rio Piedras (T. H. Jones). ♂ 1♀ June 14, 1917, Mayagüez (R. H. Van Zwalenburg).

The species (*Engytatus*) *geniculatus* Reuter has had a rather curious history in systematic literature. After studying European specimens of the genotype, *Cyrtopeltis geniculata* Fieber, it is desired to place on record the above synonymy.

Uhler (1894) was the first to indicate that *Neoproba varians* Distant is identical with *Engytatus geniculatus* Reuter, recording the species as common on the island of Grenada, and "distributed all the way from Columbia to Mexico, the Antilles, Texas, and Florida." Reuter (1909) placed his *geniculatus* in *Cyrtopeltis*, and since the name is preoccupied in that genus, the synonym *varians* Distant became available for the species. However, Reuter (1910) retracted from that position, stating that *Engytatus* differed from *Cyrtopeltis,* in structure of claws and arolia, and form of the pronotum. The present writer, after making a careful comparison of *Cyrtopeltis geniculata* Fieber and *Engytatus geniculatus* Reuter, fails to find any material difference in size or shape of claws and arolia. The slight differences found in shape of head and pronotum can only be considered specific in view of our present knowledge of the species of *Dicyphus, Macrolophus,* and related genera.

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[1] Published, with the approval of the Director, as Paper No. 275 of the Journal Series of the Minnesota Agricultural Experiment Station.

The writer has recently examined type material of *Dicyphus luridus* Gibson and finds it to be identical with *Cyrtopeltis varians* (Distant). This identity may well be confirmed from a study of the descriptions alone.

Cyrtopeltis varians (Distant) is best distinguished by the curved bifurcate process formed by the extreme apex of the male genital segment, suggesting at once a possible form of genital clasper. In fact, this development is so much like a clasper, it must in some way supplement the function of the true claspers. *Cyrtopeltis geniculata* Fieber has the distal margin of the male genital segment only slightly produced, but has just above the base of the left genital clasper a very prominent, projecting portion of the segment wall, taking the form of a truncate lobe.

Cyrtopeltis melanocephalus Reuter.

1909 *Cyrtopeltis melanocephalus* Reuter, Acta Soc. Sci. Fenn., XXXVI, No. 2, p. 63.

1917 *Engytatus melanocephalus* Van Duzee, Cat. Hemip., p. 372.

Specimens examined: ♂♂♀♀ July 22, 1899, Tourney, TEXAS (type material). The pin label gives the host plant as *Martynia louisiana,* this being misinterpreted by Reuter and recorded "(Martinya Comissiona)." OKLAHOMA—♀ Aug. "Ind. T."

This species has a lobe formed by the wall of the genital segment, just above the base of the left genital clasper, and in the same position as that found in *Cyrtopeltis geniculata* Fieber, but more acuminate in form. The shape of the head is intermediate between *varians* (Distant) and *geniculata* Fieber.

Cyrtopeltis simplex Reuter.

1909 *Cyrtopeltis simplex* Reuter, Acta Soc. Sci. Fenn., XXXVI, No. 2, p. 63.
1917 *Engytatus simplex* Van Duzee, Cat. Hemip., p. 372.

The writer has seen only type material of this species: ♀, Mts. near Claremont, California (C. F. Baker). This form is distinguished by its small size and nearly uniformly yellowish green color, although the male may have fuscous marks on front and vertex.

Cyrtopeltis tenuis Reuter has been recorded from Florida by Van Duzee but the present writer has not seen specimens of this species.

While on the subfamily Dicyphinae, or Macrolophinae of Reuter and Poppius, the writer desires to record his findings on the placement of certain genera. After considerable study of good material under the high-power binocular microscope, the following changes seem necessary: *Cyphopelta* Van Duzee, *Closterocoris* Uhler, and *Dacerla* Bergroth, have erect arolia which diverge at the tips, the pseudo-arolia small, other characters obviously placing them in the Capsini. *Sericophanes* Reuter and *Systellonotus* Fieber belong in the Orthotylinae of Van Duzee, tribe Systellonotini; *Cyrtopeltocoris* Reuter is intermediate between *Sericophanes* and *Ceratocapsus,* and judging by the thickened antennae the genus should be placed in the Ceratocapsini. In form of the arolia as well as antennae, *Teleorhinus* Uhler approaches *Orectoderus* Uhler very closely and can be separated only by the more strongly clavate antennae and by the fact that the females are apparently always macropterous.

Notice.—Owing to errors in addressing we find some subscribers have failed to receive our publication. Our present mailing list is corrected right down to date and accurate so far as our records show. Will subscribers who have failed to receive any of the numbers for 1921 please advise us at once and we will send them on.

EXCHANGES.

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Vol. XVII JUNE, 1922 No. 3

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

NEW SERIES

Smithsonian Institution
National Museum

PUBLICATION COMMITTEE

J. R. de la TORRE-BUENO,
Editor
DR. J. BEQUAERT GEO. P. ENGELHARDT

Published by the Society

Price, 35 cents Subscription, $1.50 per year

Mailed September 6, 1922

Entered as second-class matter January 21, 1919, at the postoffice at Lancaster, Pa.,
under the Act of March 3, 1879

The Brooklyn Entomological Society

Meetings are held on the second Thursday after the first Tuesday of each month from October to June, inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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CONTENTS

NEW NOCTUIDAE, Barnes & Lindsey 71
BOTH HYDROMETRAS IN KANSAS, Hungerford 78
DROUGHTS AND CANNIBALISTIC RESPONSES OF GERRIS MARGINATUS, Riley 79
NEW BORBORID FROM MARYLAND, Malloch 87
NEW N. A. ACMAEODERAE, Fall 88
PAPILIO AJAX IN N. Y., Angle 90
SAWFLIES OF TRIBE EURIINI, Rohwer 91
A N. SP. OF HELODES, Wolcott 94
TWO N. SP. OF HELINA, Malloch 95
CONCERNING PAPILIO AJAX, Dukes 97
SPREAD OF CRIOCERIS ASPARAGI, Chittenden 97

Bulletin of the Brooklyn Entomological Society

Published in

February, April, June, October and December of each year

Subscription price, domestic, $1.50 per year; foreign, $1.60 in advance; single copies 35 cents. Advertising rates on application. Short articles, notes and observations of interest to entomologists are solicited. Authors will receive 25 reprints free if ordered in advance of publication. Address subscriptions and all communications to

J. R. de la TORRE-BUENO, Editor,
11 North Broadway, White Plains, N. Y.

BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XVII June, 1922 No. 3

NEW NOCTUIDAE (LEP.).

By Wm. Barnes, M.D., and A. W. Lindsey, Ph.D., Decatur, Ill.

Subfamily Hadeninae.

Chabuata endiva **vespera** form. nov.

We have received a large number of specimens of *endiva* Smith during recent years from both Cochise and Mohave counties, Ariz. Among recent shipments from the latter there have appeared a few specimens in which the white scales of the reniform are almost completely replaced by black. The white marked reniform is so conspicuous a feature of typical *endiva* that we regard this form as worthy of a name, and propose to call it form. *vespera*.

The type series includes a holotype ♂, allotype and four paratypes ♀ from Mohave Co., Ariz., September 8–23. All are in coll. Barnes.

Subfamily Cuculliinae.

Oncocnemis punctilinea n. sp.

Head and thorax concolorous with primaries. Abdomen shining clay-yellow. Ground color of primaries rather uneven, varying from pinkish buff to pinkish brown. Basal line marked on costa by a black spot and extending more or less vaguely to cubital stem. T. a. line single, marked on costa by a black spot and thence extending obliquely across wing, sometimes continuous but usually marked only by scattered black scales. Its course is rather evenly wavy. Median shade similar, running from costal spot outward to reniform, thence obliquely inward to inner margin. It is usually traceable throughout its length, and is outwardly produced and more heavily marked on the veins. T. p. line very slender, curving outward around cell from costal spot. It is crenulate, marked on the veins by black points which are frequently the only visible portion of the line. Beyond the t. p. line the ground color blends evenly into a blackish area which terminates abruptly at the very irregular s. t. line. The outer part of the wing is slightly darker than the ground color, with the veins marked with dark gray. Orbicular usually rounded, sometimes slightly oblique; reniform moderate; both spots slightly paler than the ground color and sometimes with faint dark centers. The cell is tinged with brownish between and before the spots. Claviform rarely visible, moderate, pale. Outer margin with grayish dashes between veins, followed by similar marks which form a broken basal line in the white fringes. Secondaries translucent white, the outer third brownish gray. This band is fairly definite within, and becomes narrower toward the anal angle. It is preceded by a few dark points on the veins. Fringes white with a dark basal line. Beneath, both wings similar to upper surface of secondaries, their fringes pure white. Expanse 29–32 mm.

Described from a large series taken in Mohave Co., Ariz., September 24 to October 23, of which we have made the following types: holotype ♂, allotype, 6 paratypes ♂ and five paratypes ♀, all in coll. Barnes.

Oncocnemis deceptiva n. sp.

Head and thorax slightly darker than primaries, face blackish. Abdomen grayish clay-yellow. Ground color of primaries whitish, faintly tinged with pinkish buff and slightly irrorate with brown scales. This irroration is very light or absent near the t. p. line and quite heavy before the median shade, as a rule, except a narrow region preceding the t. a. line. The lines are as in *punctilinea* except that the median shade usually does not reach the reniform and the t. p. line is more uniformly indicated by scattered black scales, never conspicuously dotted on the veins. Spots similar, imperfectly outlined with brown. The orbicular shows a tendency to become longitudinally ovate and the claviform is usually evident. From a short distance beyond the t. p. line to the outer margin the wing is entirely blackish, but in most specimens an admixture of pale scales in the terminal portion indicates by contrast the irregular course of the s. t. line. There is a terminal series of blackish crescents between the veins. Fringes tawny at extreme base, then grayish, blending into pale gray at tips. Secondaries translucent white with a broad blackish border in outer two-fifths which narrows to anal angle and thence sends a slender, sometimes broken line to base. Veins in some females partly marked with brownish black. Fringes as in primaries. Both wings beneath similar to secondaries above. Expanse 29–32 mm.

Described from a large series taken in Mohave Co., Ariz., September 24 to October 23. The following types are in the Barnes collection: Holotype ♂, allotype, two paratypes ♂ and six paratypes ♀. We have also one ♂ taken in late August and a ♀ from Springdale, Utah, taken in June.

These two species of *Oncocnemis* are closely related to *O. linda* B. & McD., type locality Loma Linda, Cal. Both differ in the much more definite terminal band on the secondaries, while *punctilinea* is further distinguished by the clear white of these wings and the punctate t. p. line, and *deceptiva* by the heavy terminal band of the primaries. *Linda* occurs also in Mohave Co., Ariz., in September.

In the form of the male genitalia the three species differ conspicuously. In *linda* the valves are composed of a roughly quadrate piece from the upper angle of which arises the relatively small corona. The entire structure resembles in a general way the right valve of Pierce's explanatory figure (Gen. Brit. Noct. pl. I). A curved, transverse, club-shaped process appears to be the ampulla of Pierce's terminology, but may be a modified harpe. In *punctilinea* the valves are more normal in shape, broadest at the middle, whence they taper slightly to the tip. The harpe is composed of a broad, rounded lobe extending upward and basad and a slender, sharp process at right angles to it, extending upward and distad. The valves of *deceptiva* are narrow at the base, broaden to the middle and thence are parallel a short distance, when they broaden dorsad to form a long, curved corona. The harpe (?) is transitional between the structures found in the other two species. It is formed of a transverse, subrectangular lobe from which arises at its posterior angle a sharp, spine-like process.

Subfamily ACRONYCTINAE.

Cerma pallida n. sp.

Head and thorax whitish with a few black scales. Abdomen very pale gray-brown, the first tuft black. Primaries yellowish white, the lines black. Basal line curved, irregular, basal area with some scattered black scales. Space between basal and t. a. lines a clear band of the ground color. Entire wing beyond t. a. irrorate with brown. T. a. line oblique, fairly heavy, with an outward point on s. c., cubital stem, and just before inner margin. Median shade marked by a few blackish scales. T. p. line running inward from costa to R_1 above reniform, thence outward beyond cell, across wing to Cu_2, inward to below reniform and thence to inner margin, irregular throughout its course. S. t. vague, broken but rather broad. Orbicular moderate, slightly ovate; reniform rather long, deeply curved. Both spots are whitish with a few central brown scales, and are incompletely outlined with black. Tip of claviform, just below orbicular, indicated by its curved black outline. Outer margin with black dashes between the veins. Fringes whitish, cut with gray-brown opposite the black dashes. Secondaries white irrorate with gray-brown scales. In the outer third these scales form two vague lines. End of cell with a dark line. Fringes white with a few dark scales. The undersurface of both wings is white, irrorate with gray-brown. The t. p. line is visible on the primaries, the other marks very faintly so, while the secondaries show a trace of the markings of the upper surface. Expanse: ♂ 27.5 mm., ♀ 30 mm.

Described from a holotype ♂ and allotype, Mohave Co., Ariz., June 8–15, in coll. Barnes.

This species does not appear to be closely related to any of the others of the genus. We place it after *galva* Strecker, to which it shows some remote points of similarity.

Acopa pura n. sp.

Entirely white. Markings of wings gray-brown, rather vague. Basal line of primaries extending from costa to anal vein, forming an outward angle below the cell. T. a. line forming a similar angle in cell, one below it, and one between the anal and the inner margin. T. p. curved outward around cell, slender and even, then becoming irregular to inner margin. Orbicular marked by a small but heavy gray-brown spot at end of cell. Outer margin with rather heavy dashes of the same shade between the veins. Fringes white with a few dark scales. Secondaries with a vague spot at end of cell, a faint extradiscal line and dashes in the outer margin similar to those of the primaries but less heavy. Fringes white. On the under surface the discal spots and terminal dashes are visible and the discal area of the primaries is suffused with pale gray-brown. Expanse 30 mm.

Holotype ♀, Douglas, Ariz., September 16–23, in coll. Barnes.

Pura is most closely related to *perpallida* Grote, but appears to be very distinct from all of the described species.

Mammifrontia gen. nov.

Antennae simple in ♀ (♂ unknown). Palpi oblique, moderate, second joint reaching tip of frontal process, third short. Eyes large, rounded. Front with a mammiform prominence. Vestiture of thorax conspicuously hairy, with a few scales. Prothorax with a slight crest. Abdomen without crests. Front tibiae without spines, tarsi with only the usual ventral spines. Primaries similar to *Archanara* but a little more triangular than is usual in that genus. R_1 free, R_2 from areole, R_3 and R_4 stalked, connate with R_5 from apex of areole. Remaining veins free. Secondaries with R and M_1, M_3 and Cu_1 connate from angles of cell.

Type *Mammifrontia leucania* n. sp.

Mammifrontia leucania n. sp.

Head, thorax, abdomen and primaries pale brownish buff. Primaries with a few scattered gray-brown scales, most numerous in the discal area. Veins in discal area whitish. Cell with a blackish dot near middle. T. p. line indicated by fine dots on some of the veins. Fringes concolorous. Secondaries whitish. Beneath, primaries similar but with dark dashes on the outer margin and no discal marks. Secondaries with costal margin similar to primaries. Expanse 32 mm.

Holotype ♀, Cedar City, Utah, June 24–30, in coll. Barnes.

This species has the general habitus of a *Leucania*, but appears to be very closely related to *Archanara*. We know no other species, however, which has a similar frontal prominence.

Subfamily ERASTRIINAE.

Nothophila gen. nov.

Antennae finely ciliate in ♂, simple in ♀. Palpi oblique, moderate, second joint equalling frontal prominence, third small, thick, blunt. Front with a single conical prominence, slightly depressed at tip and somewhat beak-like. Vestiture of thorax scaly with some hairs. Thorax without crests. Abdomen with slight basal crest. Tibiae without characteristic structures. Primaries broad, trigonate; apex rather prominent, outer margin bent below middle. R_1 free. R_2 from areole. R_3 and R_4 stalked, short-stalked with R_5 from apex of areole. Remaining veins free. Secondaries with M_2, M_3 and Cu_1 from near lower angle of cell.

Type *Nothophila angulata* n. sp.

This genus is closely related to *Euaontia* B. & McD., from which it differs in the single point of the frontal prominence. The type runs to Hampson's *Thyatirina*, an African genus, from which it is separated by the absence of a lobe on the inner margin of the primaries.

Nothophila angulata n. sp.

Vestiture of head and body brownish white, the abdomen darkest. Basal half of primaries concolorous with thorax, the basal and t. a. lines indicated by dark brown costal spots and the remainder of the latter by a very faint curved brown line. The outer half of the wing is brown, the two areas meeting on a sharply angled line which arises from a brown costal spot above the reniform, curves along the basal margin of this spot to the inner margin of the cell, along this in a slightly curved path for a short distance basad, thence obliquely toward inner margin in a curved line, forming an acutely rounded tooth below the cell. This line is partly blackish, and is followed by a darker brown suffusion which includes the reniform. The remaining brown area includes the irregular whitish s. t. line, which is sharply angled inward opposite the cell and again outward just below. The latter angle is followed by a patch of brown suffusion and preceded by a slighter one. The line is preceded by a similar patch on the costa and followed by a faint one just below. Outer margin with blackish dots on veins. Fringes gray-brown mixed with black scales and tipped with brownish white. Secondaries whitish at base, blending evenly into the brown outer margin. Fringes brownish white. Below both wings are similar to the upper surface of the secondaries but slightly paler. Expanse: ♂ 24 mm., ♀ 29 mm.

Holotype ♂, Chiricahua Mts., Cochise Co., Ariz. and allotype, Paradise, Cochise Co., Ariz., June, in coll. Barnes.

The light and dark areas of the primaries, separated by the sharply angled line, render this species conspicuous. We know nothing with which it may be confused.

A SYNOPSIS OF THE NORTH AMERICAN SPECIES OF THE DIPTEROUS GENUS AMAUROSOMA BECKER, WITH DESCRIPTIONS OF NEW SPECIES.

By J. R. Malloch, Washington, D. C.

The only species of this genus so far recorded from North America are the three I described in the *Ohio Journal of Science* in May, 1920, pages 284–285. In order to make it possible for students of the family to identify the species, I present a key to those previously described and include the two new forms described in this paper. The types of the two now described are in the collection of Boston Natural History Society.

Key to Species.

1. Species almost entirely yellow; propleura nude.....**nuda** sp. n.
– Species with at least the thorax and abdomen black; propleura hairy ....2.
2. Fore femur with only one bristle on anteroventral surface, situated near base.........................*unispinosa* Malloch.
– Fore femur with two bristles on anteroventral surface, situated at middle...............................*bispinosa* Malloch.
– Fore femur with a large number of bristles on almost the entire length of anteroventral surface.........................3.
3. Legs largely black.....................*katmaiensis* Malloch.
– Legs entirely yellow.........................**pallidipes** sp. n.

Amaurasoma pallidipes sp. n.

Male.—Black, opaque. densely pale gray pruinescent. Anterior half of frons yellow, face, parafacials and cheeks yellowish white; basal two antennal segments brownish yellow, third black; arista brown; palpi yellow, darker basally. Thorax and abdomen unmarked, legs pale yellow. Wings clear, veins pale. Calyptrae white. Halteres yellow. Bristles mostly black, some of them and all the hairs yellow.

Third antennal segment broad, about two and one half times as long as second; one black bristle near base of vibrissa; palpi long and slender. Prealar short; scutellum with two long bristles. Abdomen normal; processes of fifth sternite long, slightly spatulate apically, yellow, and weakly haired. Fore femur with about 14 bristles in two series on the anteroventral surface, the posteroventral bristles yellow; fore tibia with a posterodorsal and an anterodorsal bristle; mid femur with about 6 anterior and 6 anteroventral bristles; mid tibia with an anterodorsal and a posterodorsal bristle; hind femur with a few sparse fine anteroventral bristles; hind tibia with 2 anterodorsal and 2 or 3 posterodorsal bristles. Length: 4.5 mm.

Type: Mt. Washington, N. H., 2,500 feet, June 13, 1916 (C. W. Johnson).

Amaurosoma nuda sp. n.

Female.—Yellow, only the third antennal segment brown. Bristles and hairs black.

Supraorbital bristles two in number, the upper lacking; arista pubescent; third antennal segment narrow and short; palpi with one or two moderately long apical hairs. Thoracic chaetotaxy as in *pallidipes*. Fore femur with a single series of bristles on anteroventral surface numbering from 10 to 12; fore tibia as in *pallidipes;* mid femur with 4 or 5 long anterior and about a dozen short anteroventral bristles, the posteroventral surface with 3 or 4 long fine bristles; mid tibia with 1 anteroventral, 1 anterodorsal, 1 posterodorsal and 1 posterior bristle; hind femur with a sparse series of bristles of very unequal lengths on anteroventral surface and 2 or 3 long bristles on basal half of posteroventral; hind tibia with 1 anteroventral, 1 anterior, 2 anterodorsal and 2 posterodorsal bristles. Length: 5.5 mm.

Type: Tyngsboro, Mass., July 13, 1919 (C. W. Johnson). Paratype: Cape Charles, Labrador, July 30, 1906. The paratype is much darker than the type.

Both Hydrometras in Kansas.—Two marsh treaders, *H. martini* Kirk. and *H. australis* Say, have been listed for America north of Mexico. The former has been reported from Ontario to Louisiana and west to Texas and Arizona, but the latter from Georgia, Florida, and Louisiana only. Collections made in Cherokee County, Kansas, by Beamer and myself have included *H. australis* Say. I have previously reported *H. martini* Kirk. for the State. Kansas lies in two zones, upper and lower austral. Cherokee County lies in the lower austral.—H. B. HUNGERFORD, Lawrence. Kansas.

DROUGHTS AND CANNIBALISTIC RESPONSES OF THE WATER–STRIDER, GERRIS MARGINATUS SAY.

By C. F. Curtis Riley, Department of Zoölogy, University of Manitoba, Winnipeg, Canada.

Introduction.

Recently, I made a rather extensive examination of much of the literature on American aquatic Heteroptera and I was interested to learn that there was practically no information on the cannibalistic responses of water-striders. Undoubtedly, it must be known that these insects, under certain conditions, feed on other members of the family to which they belong. To my surprise, I was able to find two records only—both of them comparatively recent—that made any reference to these peculiar feeding traits among gerrids. The first one was by Essenberg[1] (p. 398), who makes the following statement with respect to *Gerris orba* Stal:

> *Gerris remigis* [*orba*] is very voracious and will eat any animal matter, not disdaining its own kind. . . . In the aquarium, where there is less chance of escape, the young nymphs usually fall victims to the adults, and the stronger ones, as a rule, feed upon their weaker companions.

The second reference was a statement by de la Torre-Bueno[2] (p. 203). In some remarks on the feeding responses of *Gerris remigis* Say, while in captivity, he states that:

> If sufficiently hungry they [*Gerris remigis*] will feed on their own nymphs and even on each other.

Apparently, the remarks of both of these observers refer to gerrids in captivity, although it is possible that Essenberg also has made observations of a similar character in the field, but, from the context, this is doubtful. No other observations of this sort have come to my notice and I have not found one definite statement with respect to the cannibalism of water-striders in their own environment. Therefore, I shall record in this paper some observations of my own—made near Urbana, Illinois, during the summers and autumns of 1911–1913 inclusive—on the cannibalistic responses of *Gerris marginatus* Say, in its own habitat.

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[1] Essenberg, C., "The Habits of the Water-Strider, *Geris remigis* [Orba]," Jour. Animal Behavior, Vol. V (1915), pp. 397–402.

[2] De la Torre-Bueno, J. R., "Life History and Habits of the Larger Water-strider, *Gerris remigis* Say (Hem.)," Entom. News, Vol. XXVIII (1917), pp. 201–208.

Description of Habitat.

The observations, that now are to be recorded, were made in connection with a small intermittent stream situated about one mile northeast of Urbana, Illinois. It flows in a general northwesterly direction, receiving some sewage in its course, but the water is usually clear. The brook has a muddy bottom, with short herbaceous vegetation along its margins. There are no trees along the greater part of its course, therefore the water receives little shade. In width it varies from about two feet to five feet, with a depth seldom more than six inches, and frequently less than this. The current is sluggish in many places, while in others it runs more rapidly. In general, however, the current is slow and there are areas of quiet water, which are almost pool-like in character.

Such a stream forms a habitat well suited to the general responses of *Gerris marginatus,* but it is not of the character where *Gerris remigis* Say is usually found. The former species has been observed on the surface of this brook for several successive seasons, in greater or lesser numbers; but the latter species has not been found anywhere in this habitat. I frequently have taken *Gerris marginatus,* both alate and apterous individuals, from this stream. They congregate in small groups on the surface-film, usually where there is little current. Often they are found along the margins, among the aquatic plants and also in small bays formed by the land jutting out into the water.

Effect of Drought on Habitat.

It has been stated that the stream under discussion is a sluggish one and that in many places along its course there are reaches of quiet water. There is not that succession of shallow rapids and deeper pools which is so common in swift intermittent streams of this size. *Gerris marginatus* inhabits the surface-film of this stream from early spring until late fall, with the exception of certain periods during times of drought. These periods of dry weather occur, usually, in the months of July and August, and sometimes in the early part of September. This does not mean that a continuous drought always exists throughout these months, although a drought may persist, with some intermittent rains, through this period. However, it is more likely to be in evidence during parts of all three months, but it may occur in only two of them, July and August.

As the drought develops, the water in such a stream decreases in amount rather rapidly, until there is produced a series of pool-like formations connected by means of narrow bands of flowing water. If the dry weather continues, this condition does not persist very long. The areas of flowing water disappear, leaving a succession of isolated shallow pools. It has been stated that the stream under normal conditions is shallow, its depth being usually about six inches, although portions of it are somewhat deeper than this. Therefore, the pool-like areas and the linked bands of flowing water are only a few inches deep. While this condition is somewhat comparable with the intermittent riffle and pool stage existing in swiftly flowing streams, during early periods of drought, yet there are not found the deep pools and alternating shallow riffles so common in such streams.

EFFECT OF DROUGHT ON MIGRATION AND FOOD-SUPPLY.[3]

At the inception of the drought, there is little difference between those areas of the stream that become pools and those that become the connecting links of flowing water. The former are in the deeper and quieter water, while the latter are in the shallower and more agitated water. Although water-striders are found to be more abundant on the deeper and quieter water than elsewhere, except near the shore, they are present also, in few numbers, on the shallower and more agitated water. However, as the water decreases in volume, these insects are observed to collect in greater and greater numbers on those areas which are to become pools, and it is noticed that they leave those parts which will become the links of flowing water connecting the pools. The decrease in amount of water emphasizes the action of the current in the latter areas, therefore these become unsuitable haunts for *Gerris marginatus*. As the dry weather continues and the water shrinks in volume still more, the narrow bands of running water entirely disappear. The stream now consists of a series of very shallow isolated pools. The water-striders must either migrate or become trapped on the surface-film of these pools of water. I believe that migration does occur—but I cannot say how frequently—under these conditions, because sometimes I have observed a decrease in the numbers of winged adults from one day to another. The migratory response probably takes place at night. I have not observed the act of migration just at the period when the habitat changes from a condition of running water to one of isolated pools.

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[3] For a discussion of a somewhat similar phase of this subject, attention is directed to another of my papers: Riley, C. F. C., "Migratory Responses of Water-Striders During Severe Droughts," BULL. BROOKLYN ENTOM. SOC., Vol. XV (1920), pp. 1–10.

Occasionally, throughout such periods of drought, pools persist, on which water-striders may remain—if there is a sufficient amount of food—until the period of dry weather has passed. In such situations, and under such circumstances they continue to feed, to copulate, and to engage in other daily responses. The various breeding responses are performed under such conditions, and many nymphs in different stages of development are found. If the drought is not too severe, there will be enough floating insect food on the surface of the pools, for the needs of the water-striders, and they will be tided over until the rains come. The dry weather may prove so persistent that—even should the pools of water continue to exist—there may be a dearth in the food-supply. Under such conditions, the water-striders migrate to some larger body of water.

CANNIBALISTIC RESPONSES: THEIR RELATION TO MIGRATION AND FOOD-SUPPLY.

Lack of food *per se* does not always result in the migratory response, but the water-striders develop cannibalistic "habits" and attack other weaker adult individuals and the nymphs of their own species. By attacking their own kind, the more vigorous water-striders survive and manage to tide over this period of semistarvation, until the rain comes, and with it more food. Even if precipitation proves to be very intermittent and the pool stage in parts of the stream continues until late fall, the stronger, more agile water-striders survive owing to the cannibalistic response referred to. However, it should be stated that many individuals migrate before scarcity of food reaches the starvation point. If they are unsuccessful in their attacks upon individuals of their own kind, and there is no other food, they may migrate. In fact, the disturbance caused by such attacks may of itself be a strong factor in inducing the migrating response.

On the other hand, there may be an abundant food-supply, but, owing to the drought, the water in the pools may evaporate rapidly. This is especially the case in exposed situations—situations in which there are no trees along the banks of the stream to protect it from the hot rays of the midsummer sun—as is the case of the stream under consideration. In such cases the water-striders migrate when the pools become dry.

Sometimes, during such droughts, in small streams of this character, the pools become very restricted in area. Frequently, they are so small that the surface dimensions are not more than twenty inches in length by twelve inches in width, and they may have an area even smaller than indicated here. It is evident that in such pools, the cannibalistic activities of certain individuals are more in evidence than is the case in pools of larger areas. Occasionally, I have observed as many as seventy-five water-striders, both adults and nymphs, in a pool of the dimensions stated. Those individuals with cannibalistic "habits" cause much disturbance and activity among the other members of the water-strider population of the pool by their attacks on them. Sometimes vigorous contests ensue before the attacker vanquishes its victim. Weak and sluggish individuals are usually devoured first; but frequently the cannibalistic water-strider attacks and attempts to seize healthy, vigorous specimens. Generally, these escape the fate of their weaker associates, but sometimes one is captured by the attacker. Then a struggle ensues; and the "intended" victim may or may not escape, for this contingency depends upon its agility and strength.

When such attacks occur and are continued, the other water-strider inhabitants of the pool stride away in various directions to avoid these encounters. As the surface area of the pool becomes more and more restricted, persistent attacks of this sort frequently cause the molested individuals to migrate by flight. Water-striders that have not been attacked directly, but, in the commotion of the chase, have scurried about from one part of the pool to another, also may eventually migrate. However, it is a matter of interest to observe how much of this sort of disturbance, the other water-striders will endure before they leave the pool. They employ various responses in order to escape their cannibalistic associates. They stride rapidly back and forth over the surface-film, and sometimes make short jumps from it, when closely pursued. Occasionally, when about to be seized by their attacker, they rise from the water-film and hazard brief flights. On occasion, during such attacks, they have been observed to stride from the surface-film onto the narrow area of mud-flat surrounding the pool, and to move, by jumping in an ungainly fashion, for a few inches away from the pool. Under such circumstances, it is my observation that, after the lapse of a few minutes, they return to the water-film.

In this connection attention is directed to certain water-strider responses observed by Weiss[4] (p. 33) who noticed that when apterous specimens of *Gerris marginatus* are taken from a pond, they immediately return to the water, and accomplish this without "hesitation." However, it should be stated that the pond was very much larger than any of the pools under consideration, for it contained about "three thousand square feet of water." The water-striders were "liberated at distances of one, two, three, four, five, six, seven, eight, and nine yards" from the pond. Essenberg[5] has observed the movements on the land, of *Gerris orba,* a congener of *Gerris marginatus,* with respect to which, she makes the following remarks:

> *Gerris remigis* [*orba*] can live on land as well as in water. It runs with a jerking motion, making from four to six jumps in succession and then making a short stop. Very often it

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[4] Weiss, H. B., "Notes on the Positive Hydrotropism of *Gerris Marginatus* Say and *Dineutes Assimilis* Aube," Can. Entom., Vol. XLVI (1914), pp. 33–34.

[5] Loc. cit., p. 399.

> turns a somersault and continues running without interrupting its course until it reaches a place of safety. There it lies quietly for from fifteen to twenty-five minutes, then suddenly begins its race again.

Gerris remigis, a species closely related to *Gerris marginatus* and to *Gerris orba,* can live and readily move about on the land. In a series of papers by me[6] there is considerable discussion of the responses and locomotion of *Gerris remigis,* after the water in its brook habitat has completely disappeared, due to drought, and the individual gerrids are found in the dry bed of the stream. There are also records of observations on the ability of these insects to find water after having been removed from it.

Attention has been directed to the fact that *Gerris marginatus* may be induced to leave, temporarily, a pool of water and to move onto the adjacent mud-flat, and that the water-striders even may be caused to migrate from the pool by flight. It is interesting to notice that both these responses are due to the stimuli of repeated cannibalistic attacks of certain members of their own kind. It has been stated that the stimuli that produce these responses, cause much disturbance among the water-striders on the surface-film of the pool, and that there is much rapid movement—striding back and forth over the water-film, jumping from the surface, or even short flights over it—on the part of these insects.

It is rather curious to observe that stimuli of a somewhat different character—as for example, sweeping the collecting net just above and through the water, wading through the water, or beating the surface-film with a leafy branch of a tree—produces the various responses, striding, jumping, and flying, enumerated just recently. However, these stimuli do not cause the water-striders to migrate by flight, or even to move off the surface-film onto the land. It is somewhat strange that stimuli of the character described—manifestly much more vigorous, and ostensibly resulting in greater disturbance and apparent discomfort to the water-striders than the cannibalistic attacks of their associates—neither provoke *Ger-*

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[6] Loc. cit. Ibid., "Some Habitat Responses of the Large Water-Strider, *Gerris Remigis* Say," Amer. Nat., Vol. LIII (1919), pp. 394–414, 483–505; Vol. LIV (1920), pp. 68–83.

ris marginatus to migrate by flight, nor to move from the surface-film onto the land, in order to escape such unusual conditions. Essenberg[7] noticed different results in her observations of *Gerris orba*. She makes the following statement:

> When disturbed while on the water the insects betake themselves quickly to the land or among the weeds, and hide by clinging to the lower surface of the leaves or by lying quietly on the ground.

In this connection it may be stated that it is very difficult to induce the flying responses on the part of *Gerris marginatus;* but I have invoked the response by the following procedure: Place a water-strider in a test tube, closing it by means of a cork, and leave the gerrid within for some thirty minutes or more. At the close of this time remove the cork and project the mouth of the test tube a few inches beyond the outer window sill of a third or fourth story window. Now permit the insect to escape and it will drop for some distance, without spreading its wings, but, usually, before reaching the ground it responds by flying away.

CONCLUSION.

Cannibalism in *Gerris marginatus* has been observed by me in a few isolated instances, when the water-striders were *confined* in an aquarium, and also on a *very few* occasions, in their normal habitat, previous to the observations recorded in this paper. However, it is not evident, at least from my own experience, that cannibalism is a common, normal form of activity. In these instances that have been mentioned, the victims usually have been either weak or water-logged adults, or defenceless, non-agile nymphs. Cannibalism generally occurs during periods of stress or of great scarcity of food and probably is not a normal phase of behavior, but is rather of a sporadic character. It is likely that the instinct—the response—remains dormant, in a very large measure, until the necessary stimulation arouses it into full action.

During severe and long-continued droughts, extending over a large area of territory, accompanied—as they often are—by a decided scarcity of food supply, there is the possibility of great numbers of gerrids dying through starvation. This is likely to be the case notwithstanding the fact that the alate individuals may migrate. In fact, it is quite possible that all the members of the species may be destroyed in certain unfavorable and drought-stricken regions. It is probable that the actual operation of this, more or less dormant but potential, cannibalistic response in *Gerris marginatus* is not entirely a harmful form of behavior, but on the other hand, it is quite within the bounds of probability that such an activity is of a more or less beneficial character to the species itself—as, due to this cannibalistic trait, the stronger individuals are preserved to perpetuate the race—although it may not be so, always, to the individual.

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[7] Loc. cit., p. 398.

A NEW BORBORID FROM MARYLAND (DIPTERA, BORBORIDAE).

By J. R. Malloch, Washington, D. C.

Leptocera intrudens sp. n.

Male.—Black, shining. Head yellow, ocellar region brownish, antennae fuscous. Thorax unicolorous black. Abdomen more distinctly shining than thorax, the hypopygium glossy. Legs yellowish, mid and hind pairs darker. Wings brownish fuscous, with a narrow fascia beyond cross-veins and the apex of wing broadly hyaline. Halteres fuscous.

Frons with very minute interfrontal hairs, each orbit with 1 bristle; arista pubescent, long and filiform; vibrissa slender. Thorax with 2 pairs of dorsocentrals; scutellum with 4 bristles, the basal pair shortest. Hypopygium stout. Tibial bristles very short. Venation as in *meridionalis* Malloch.

Length 1 mm.

Type, Beltsville, Md., May 21, 1922 (J. R. Malloch). The type specimen is in the author's collection.

This species is the only one known to me from this country which has the wings maculated. Several Costa Rican species belong to the same group.

NEW SPECIES OF NORTH AMERICAN ACMAEODERAE.

By H. C. Fall, Tyngsboro, Mass.

The making known of a fine new *Acmaeodera,* loaned me for study by Mr. Alan S. Nicolay, of Brooklyn, N. Y., furnishes an opportunity for adding descriptions of four other forms, for some time held in suspicion in my own cabinet, and to which I trust the accumulation of further material will confirm my judgment in giving distinctive names.

Acmaeodera aurora new species.

Length 9.2 mm.; width (across humeri) 3.7 mm.

Form rather stout, not strongly cuneiform. Head, thorax and body beneath aeneous; elytra yellow, the point of the humeral umbo black, the lateral margins reddish for a short distance at apex. Pubescence whitish throughout, conspicuous on the thorax, sparse on the elytra, dense and long at the sides of the body beneath. Clypeus very broadly emarginate. Head and sides of thorax densely punctate, the punctures becoming well separated toward the middle of the thoracic disk; elytra moderately punctate striate, the striae lightly impressed at sides and apex. Prosternum sparsely punctate; ventral segments more finely so at middle; last ventral with evident apical plate, the free edge of which is narrowly rounded.

Jacumba, San Diego Co., California, 12–VIII–17.

Described from a single specimen submitted by Mr. Alan Nicolay, who retains the type.

This species is at once separable from all previously described North American forms by the almost entirely yellow elytra. The front margin of the prosternum has a strong lobiform tooth each side, which places the species in the "Sinuatae" where it may best precede *recticollis.*

Acmaeodera auritincta new species.

Length 11.5 mm.; width 5 mm.

Form very robust, nearly as in *falli;* the prothorax, as in that species, a little wider at base than the elytra and strongly narrowed in front. Head, thorax and ventral surface golden green, immaculate; elytra intricately varied with green and yellow, the latter color predominating, the green areas with a golden lustre on the disk, but darker and slightly bluish at the margins. Punctuation of the thorax very dense and nearly uniform throughout; elytral serial punctures coarser than in *falli;* erect hairs of upper surface entirely whitish. Prosternum very feebly trisinuate in front; last ventral with thin free apical plate, its apex sinuato-truncate.

Described from a single specimen bearing label Kent, Culberson Co., Texas, Sept. 17–18, '12, R & H, 3,900–4,200 feet.

While manifestly allied to *falli,* it is difficult to believe that it can be even an extreme form of that species. In *falli* the color is deep blue-green, this color predominating over the yellow on the elytra, the prothorax much less densely punctate, the strial punctures of the elytra coarser, the erect hairs of the upper surface entirely fuscous.

Acmaeodera nexa new species.

Length 7.5 to 8 mm.; width 2.6 to 2.8 mm.

Narrow, feebly cuneiform, black bronzed, polished; erect hairs numerous, predominantly whitish at sides becoming fuscous toward the middle of the disk. Prothorax unspotted; elytra each transversely marked with yellow as follows: two small spots at basal sixth, a narrow external fascia at middle, a still narrower and slightly oblique fascia from margin inward to second stria at about apical third, and two small subapical spots. The two subapical spots may be united, and the oblique fascia before them may be divided into two spots.

The type is from the San Bernardino Mts., California, and bears date "VI–5–16." Other examples are from Mt. Lowe, Mt. Wilson and Camp Baldy, all in the Sierra Madre Mountains in Southern California.

This species is closely related to *angelica,* but is of more slender form as a rule, the markings entirely yellow (the two posterior marginal spots reddish in one example) and the last ventral merely depressed around the edge without evident double margin at tip.

Acmaeodera liberta new species.

Length 7.2 to 9 mm.; width 2.5 to 3.3 mm.

Depressed, rather strongly cuneiform; black, scarcely or feebly bronzed. Of the *labyrinthica-cuneata* type, the form nearly as strongly attenuate as in *cuneata* but with more limited and isolated maculation which seems to separate it quite definitely from either of these species, in both of which the markings are much more profuse and always more or less longitudinally coalescent. The markings in *liberta* consist of two longitudinal series of small yellow spots, one marginal and submarginal, the other discal, of which the pair at the middle unite to form a short somewhat oblique fascia. The last ventral has a thin apical plate, the free edge of which is broadly evenly rounded.

Described from six examples, the type and two others collected by Dr. Fenyes at Independence, California; the others from "Arizona" from the Wm. T. Davis collection. The species may best follow *cuneata* in a cabinet arrangement.

Acmaeodera tenebricosa new species.

Length 6.3 to 8 mm.; width 2.2 to 2.7 mm.

Very similar in nearly all respects to *dolorosa*, from which it differs as follows: The form is rather less depressed, the prothorax less rounded before the base and even more densely punctate, the punctures being virtually in mutual contact throughout. The ventral surface is slightly less closely punctate and the terminal segment entirely lacks the more or less angulate apical plate or crest which is quite evident in all specimens of *dolorosa* seen.

Described from five examples, of which four, including the type, were taken at Havilah, Kern Co., California, VI–6–13, by Mr. G. R. Pilate. The fifth example was captured at Bear Lake, California, 6–15–17, by Mr. J. O. Martin.

Tenebricosa should precede *dolorosa* in a cabinet arrangement.

Papilio ajax in New York.—A recent visit to a large paw-paw grove near Brockport, N. Y., resulted in the taking of several imagos, larvae and one pupa of *Papilio ajax* (Linn.). The existence of this southern swallowtail as a permanent resident in this section may be of interest to some. It has without doubt become settled there as I find a mention of the grove and the presence of *ajax* as early as 1870.—James L. Angle, Rochester Municipal Museum.

NOTES ON SAWFLIES OF THE TRIBE EURIINI, WITH DESCRIPTIONS OF TWO NEW SPECIES.

By S. A. Rohwer, Bureau of Entomology, Washington, D. C.

In 1911[1] the writer proposed the tribe Euriini for the genera *Eurys* Newman, *Neoeurys* Rohwer, *Europsis* Kirby and *Clarissa* Kirby and in 1918[2] he added to the tribe the genera *Ancyloneura* Cameron and *Polyclonus* Kirby. In 1919[3] Morice tabulated the sawfly genera of Australia and gave a number of valuable notes on these little known genera. On page 257 Morice suggests that the genus *Eurys* (=*Europsis*) can be separated from *Neoeurys* and *Clarissa* by the obliquely truncate radial cell which is followed by a distinct appendiculate cell. This character, when considered in the light of the two new species here described, does not seem to offer a satisfactory way to separate the genera. Morice has shown that the only other character, the number of antennal joints, used to separate the genera is subject to considerable variation and cannot be used as generic. In assigning species to any of these genera it is therefore necessary to limit the genera by different characters and the following key is offered as a suggestion. So few species of this group are known and so little is known about these species that it is difficult to propose any arrangement as satisfactory, and impossible to pass on the actual value of any of the genera.

KEY TO THE GENERA.

1. Antenna ramose in both sexes.......*Polyclonus* Kirby.
– Antenna simple.................................2.
2. Clypeus emarginate; nervulus in, or very near, middle of cell.........*Eurys* Newman (=*Europsis* Kirby).
– Clypeus truncate; nervulus distinctly basad of middle cell ....3.

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[1] Proc. Ent. Soc. Wash., Vol. 18, No. 4, p. 226.

[2] Ann. Mag. Nat. Hist., Ser. 9, Vol. 2, Nov. 1918, p. 437 and 439.

[3] Trans. Ent. Soc. Lond., for 1918 (pub. Mar. 1919), p. 247–332.

3. Clypeus long, its width being about twice its length; antenna robust, thickening apically....*Clarissa* Kirby.
– Clypeus short, its width being about four times its length; antenna slender, elongate and not thickening apically.4.
4. Hind basitarsus much longer than the following joints; antennal furrows more or less complete. *Neoeurys* Rohwer.
– Hind basitarsus shorter than the following joints; antennal furrows obsolete..........*Ancyloneura* Cameron.

Clarissa froggatti n. sp.

On the character of the radial cell this species will fall in the genus *Eurys* as defined by Morice[4] but in general habitus is much like *Clarissa divergens,* from which it may be separated by the black spot on the prescutum, the black mesepisternum, the shorter and stouter antenna, black clypeus, venation, etc. *Clarissa inconspicuus* (Kirby) is much smaller.

Female.—Length 6.5 mm. Middle fovea elongate, not sharply defined, broader below; antennal furrows complete; postocellar furrow poorly defined; antenna 9-jointed, distinctly thickened apically, third joint cylindrical but little shorter than the fourth and fifth; sixth, seventh and eighth joints much longer than wide; stigma strongly tapering apically; radial cell obliquely truncate and followed by distinct appendiculate cell; radiellan cell truncate and followed by a long appendiculatellan cell; venation otherwise much like *divergens.* Black; palpi ferrugineous; pronotum, scutum, sides of prescutum, scutellum, tegula and abdomen except apical three tergites medianly and sheath, ferrugineous; legs black, four anterior tibia and tarsi (the latter slightly dusky) and basal half of hind tibia ferrugineous; wings dusky hyaline, venation black.

Male.—Length 5 mm. Differs from the female as follows: antenna slightly longer, joints six to eight with length and width subequal; four anterior femora (except bases of middle pair) and posterior tibiae and tarsi ferrugineous; scutum and prescutum almost entirely black. At some angles the apical antennal joint seems to be divided making the antenna appear ten-jointed.

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[4] Trans. Ent. Soc. London, 1918 (1919), p. 257.

Paratype male agrees with allotype.

Type-locality.—Warrah district, New South Wales.

Described from one female (type) and two males (one allotype) swept from grass by W. W. Froggatt, October 20, 1921. Named for the collector.

Type.—Cat. No. 24717, United States National Museum.

Clarissa anomocera n. sp.

Because of the faint metallic tinge this species has the appearance of the genus *Eurys* but it does not have the characters assigned to that genus either in the above key or in the key given by Morice.[5] Of the described species of *Clarissa* it is more closely allied to *atrata* Turner but it lacks the abdominal marks and differs in other ways.

> *Female.*—Length 5 mm. Middle fovea shallow, poorly defined; antennal furrows nearly complete; postocellar furrow wanting; antenna short, 8-jointed, third joint subequal with fourth plus fifth, seventh joint with width and length subequal; stigma about three and one half times as long as its greatest width, strongly tapering; radial cell pointed, appendiculate but not followed by a distinct appendiculate cell; radiellan cell pointed. Dark metallic green; apices of femora, the tibiae and tarsi (latter infuscate apically) yellowish-white; wings dusky hyaline; venation dark brown; head and thorax with short white hair.
>
> *Male.*—Length 4.5 mm. Agrees with the female except as follows: antenna somewhat more slender, third joint shorter than four plus five, seventh joint longer than wide; wings hyaline; radial cell obliquely truncate and with a rather distinct appendiculate cell following.

In one male paratype the second recurrent and second intercubitus are interstitial. The other paratypes agree with the types.

Type-locality.—Moree, New South Wales.

Described from three (one type) females and three (one allotype) males swept from grass by W. W. Froggatt, June 6, 1914.

Type.—Catalogue No. 24718, United States National Museum.

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[5] Trans. Ent. Soc. Lond., 1918 (1919), p. 257.

[6] Trans. Ent. Soc. Lond., 1918 (1919), p. 298.

Neoeurys tasmanica Rohwer.

Morice[6] suggests that his *N. caudata* may be the same as this but this can hardly be the case as the abdomen of *tasmanica* (type female) is concolorous metallic blue-black while *caudata* is described as having the apex of the abdomen pale testaceous.

A NEW SPECIES OF HELODES (HELODIDAE, COL.).

By A. B. Wolcott, Chicago, Ill.

Forty-two years have elapsed since Dr. Geo. H. Horn published his "Synopsis of the Dascyllidae of the United States" (Trans. Amer. Ent. Soc., VIII, 1880, pp. 76–114), in which only one species of the genus *Helodes* Latreille was described as new; the list of species stands today exactly as left by Dr. Horn at that time.

The present species is the second of the genus to be made known from California, the first and only species as yet recorded from that state being *H. apicalis* LeConte.

Helodes nunenmacheri sp. nov.

> Form oblong-oval, black; thorax broadly yellow at sides, narrowly so at apex; legs dull testaceous (the posterior pair, and knees and tibiae of middle and anterior pair fuscous); moderately shining; rather densely clothed with short, fine, brownish, silken pubescence. Head finely, sparsely punctate. Thorax one-third wider than long, narrower in front; apex truncate; anterior angles obtusely rounded; apical and lateral margins narrowly reflexed; sides strongly rounded; base bisinuate; disk rather feebly convex; punctuation a little finer and closer than that of head. Elytra very finely, not closely punctate. Body beneath finely, evenly, not very densely punctulate. Length 4.4 mm.

Del Norte Co., Cal., May 27, 1910 (F. W. Nunenmacher).

A more oval species than *H. apicalis* Lec., to which it is allied by having the head visible from above, but similar in coloration to *H. maculicollis* Horn which occurs in the Atlantic States and Canada. Compared to *H. apicalis* this species has the head, thorax, elytra and body beneath more finely and sparsely punctate; the thorax proportionately broader, its sides more strongly rounded and the apical margin truncate, not somewhat arcuate as in *apicalis*.

TWO NEW SPECIES OF THE GENUS HELINA R.-D. (DIPTERA, ANTHOMYIIDAE).

By J. R. Malloch, Washington, D. C.

The type specimen of the first species described herein is in the collection of Leland Stanford University and the second in that of Illinois State Natural History Survey.

Helina multiseriata sp. n.

Male and female.—Black, slightly shining, densely gray pruinescent. Antennae black, basal two segments brownish; palpi black, paler at bases. Thorax with four narrow fuscous vittae. Abdomen in both sexes with a faint linear dorsocentral fuscous vitta, in male only with two pairs of faint brownish spots, one on second and the other on third tergite. Legs yellow, coxae, and in male bases of fore femora, infuscated, tarsi black. Wings clear, veins brownish yellow, paler basally, cross-veins not or only faintly clouded. Calyptrae and halteres yellow.

Male.—Eyes almost bare, separated at narrowest part of frons by about twice the width of third antennal segment; interfrontalia complete; parafacial wider than third antennal segment; orbital bristles continued to middle; cheek higher than widest part of parafacial. Thorax with three pairs of postsutural dorsocentrals; prealar short but strong; presutural acrostichals absent; hypopleura bare. Basal abdominal sternite bare. Fore tibia with a posterior bristle; basal segment of fore tarsus with some fine outstanding sensory hairs along posterior side; mid femur with three or four strong bristles on basal third of posteroventral surface; hind tibia with from three to six posterior bristles; hind femur with about seven rather closely placed bristles on apical third of anteroventral surface and a few fine bristles near apex on posteroventral; hind tibia with one or two anterodorsal bristles, a series of fine bristles on almost the entire length of anteroventral surface, some short setulae on posterodorsal surface, and the entire length of posteroventral surface with several series of long bristly hairs; veins 3 and 4 divergent apically.

Female.—Frons over one third of the head-width, upper two bristles on each orbit directed backward, the orbits setulose laterad of the bristles; hind tibia without the posterodorsal setulae and long bristly hairs, and with about four strong anteroventral bristles. Length, 9–10 mm.

Type, male, and allotype, Pullman, Wash., July 15, 1908 (W. M. Mann).

Most closely related to *oregonensis* Malloch, to which it will run in my recently published key to the species of this genus. That species has the longest hairs on arista not nearly as long as the width of third antennal segment, the parafacials narrower, prealar very weak, fore tibia without a median posterior bristle, the abdominal spots elongate and subquadrate, and the femora in male darker, the fore pair being almost entirely fuscous.

Cothurnata Zetterstedt differs from both species in having the cross-veins with conspicuous spot-like infuscation.

Helina algonquina sp. n.

> *Male.*—Similar in color to *hirtibasis.* The abdomen has a minute black dot at base of each hair and bristle on dorsum, the dorsal spots are black, and larger than in *hirtibasis,* the fore tibiae are slightly infuscated, and the cross-veins of wings are noticeably darkened.
>
> Structurally the species very closely resembles *spuria* Malloch, but the arista is less densely hairy and the longest hairs on it are about as long as the width of the third antennal segment. The presutural acrostichal hairs are closer together than in *spuria,* being less widely separated from each other laterally that they are from the dorsocentrals; prealar absent; dorsocentrals 3; sternopleurals 1:2. Fifth abdominal sternite with a very deep V-shaped posterior excision as in *spuria.* Mid tibia with three posterior bristles; hind femur bare on posteroventral surface, the anteroventral surface with 3 or 4 bristles on apical half, the remainder of the surface with a few short erect hairs; hind tibia with one anteroventral, three anterodorsal, and two posterodorsal bristles, the latter long, the apical one shortest and a little beyond middle; in *spuria* the apical posterodorsal bristle is longest and situated at middle. Outer cross-vein almost straight. Length, 6 mm.

Type, Algonquin, Ill., May 20, 1908 (W. A. Nason).

This species will run down to the last caption of the key to which reference was made under the last species, but may be separated from *Xenomydaea buccata* Malloch by the absence of setulae at base of third wing-vein, and from *spuria* by the bare posteroventral surface of hind femur, *spuria* having some short bristles at middle on this surface.

CONCERNING PAPILIO AJAX.

By W. C. Dukes, Mobile, Ala.

The spring form of *P. ajax,* which Dr. Holland calls *floridensis,* appears in this latitude during the early days of March, and St. Patrick's Day is usually associated in the writer's mind with this species.

The high winds generally prevailing at this season seem to augment the rapid flight of this butterfly, and also to cause it to soon lose its tails, so that unless one is fortunate enough to secure one freshly emerged, it is difficult to get specimens fit for the cabinet.

The writer has had best success by resorting to the following expedient. When one or more are captured, although in a damaged condition, they are used as decoys. A protected, sunny spot is selected in a location where the food-plant (*Asimina parviflora*) grows in abundance, and one or more of the damaged specimens are arranged on the ground in the sunlight, the collector being on the alert to take the flying insect, "en passant," as it hovers a moment over the decoy. In this manner, some ten or twelve specimens were secured on a recent trip, of which unfortunately only about six or seven were perfect enough to retain.

Recent Spread of Crioceris asparagi L.—July 10, 1922, Prof. H. F. Wickham reported the occurrence of *Crioceris asparagi* L., at Iowa City, Ia. The occurrence of the species in that particular locality seems to be entirely new, as Professor Wickham failed to find it in other gardens. This seems to be the first positive record of its occurrence in Iowa, although it has been known on the borderline between Illinois and Iowa for a period of years. Prof. A. L. Lovett reported the species in Multnomah County and about Portland, Ore., in October, 1917, and Prof. A. G. Ruggles observed it at the St. Croix River, Minn., in 1919 and 1920.—F. H. Chittenden.

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BULLETIN of the BROOKLYN ENTOMOLOGICAL SOCIETY,

Volumes 4 to 7 per vol.	1.75
Volume 8 (7 nos.)	1.25
Volumes 9 to 14 (5 nos. each), each	1.25
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Vol. XVII OCTOBER, 1922 No. 4

BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

NEW SERIES

Smithsonian Institution
NOV 13 1922
National Museum

PUBLICATION COMMITTEE
J. R. de la TORRE-BUENO,
Editor
DR. J. BEQUAERT GEO. P. ENGELHARDT

Published by the Society

Price, 35 cents Subscription, $1.50 per year

Mailed November 10, 1922

Entered as second-class matter January 21, 1919, at the postoffice at Lancaster, Pa.,
under the Act of March 3, 1879

The Brooklyn Entomological Society

Meetings are held on the second Thursday after the first Tuesday of each month from October to June, inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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CONTENTS

NEW CARABIDAE, STAPHYLINIDAE AND ELATERIDAE, Notman 99
A NEW GENUS OF HELOMYZIDAE, Aldrich 108
ISOPARCE CUPRESSI, Dukes 110
THE DRAGONFLY EPICORDULIA REGINA, Davis 111
THE HISTORIES OF N. AM. CATOCALAE, Mayfield 114
RECORDS OF AQUATIC HEMIPTERA, Torre-Bueno 120
TWO N. SP. OF AEGERIIDAE, Barnes and Lindsey 122
CHANGE OF NAME IN ISCHNODEMUS, Parshley 123
THE INALIENABLE RIGHT OF AUTHORS, J. R. T. B. 124
SILAS C. WHEAT, G. P. E. 125

Bulletin of the Brooklyn Entomological Society

Published in

February, April, June, October and December of each year

Subscription price, domestic, $1.50 per year; foreign, $1.60 in advance; single copies 35 cents. Advertising rates on application. Short articles, notes and observations of interest to entomologists are solicited. Authors will receive 25 reprints free if ordered in advance of publication. Address subscriptions and all communications to

J. R. de la TORRE-BUENO, Editor,
11 North Broadway, White Plains, N. Y.

BULLETIN
OF THE
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Vol. XVII October, 1922 No. 4

NEW SPECIES OF CARABIDAE, STAPHYLINIDAE, AND ELATERIDAE.

By Howard Notman, Brooklyn, N. Y.

The following eight species of Carabidae, believed to be new, were found in a collection sent to the writer for identification by Mr. A. B. Champlain from the collection of the Bureau of Plant Industry at Harrisburg, Pa.:

Bembidion parvulum n. sp.

Form oval, somewhat elongate, depressed. Color black, shining, very feebly bronzed, outer antennal joints feebly picescent. Head alutaceous, thorax feebly so. Head four fifths the width of the thorax, as wide as the thorax at apex, distinctly transverse, eyes prominent, convex, frontal grooves parallel, rather broad but not shallow, extended anteriorly on the clypeus, on the latter also a short, narrow, oblique outer groove on either side. Antennae short, scarcely more than two thirds the length of an elytron, medial joints not quite twice as long as wide. Thorax nearly or quite twice as wide as long, nearly three fourths the width of the elytra, base and apex equal in width; transverse impressions distinct; median line strong, well impressed, abbreviated at either extremity; thorax widest at apical third, sides strongly rounded anteriorly, oblique posteriorly and broadly and very faintly sinuate, posterior angles strongly obtuse, side margins distinctly deplanate and finely reflexed, expanding posteriorly; basal foveae broad, flat, rugose, bistriate, carinae long and very distinct. Elytra one half longer than wide, sides slightly narrowed in basal sixth, subparallel to apical third, semicircularly rounded at apex, humeri distinct, basal margin extending obliquely inward to the fourth stria; striae entire, subimpunctate, well impressed on the disk, intervals convex, sixth and seventh less distinct, eighth strongly impressed apically, joining the margin at basal third, the first and second are circularly confluent at apex, the fourth joins the second subapically, the third being confluent with the fourth anteriorly thereto. Discal foveae on the third stria at slightly more than one third and two thirds from the base. Length 2.8 mm., width 1.15 mm. 1 ♀.

Mt. Rainier, Wash., July 15, 1906, Paradise Park, 6,000 ft.

Type (♀), Collection Bureau of Plant Industry.

This species is closely related to *B. decrepitum* Csy. and *B. complanulum* Mann. It may be distinguished by its broad thorax with very obtuse posterior angles and its short antennae with dark basal joints. The elytra in *complanulum* are said to be short ovate ("breviter ovatis"). In *B. parvulum* they are distinctly elongate.

Tachyta parvicornis n. sp.

Form elongate, parallel, depressed. Color piceous black; legs and antennae rather pale rufo-piceous, femora scarcely darker. Integuments feebly shining, finely, densely and uniformly alutaceous. Head slightly transverse, four fifths the width of the thorax, as wide as the thorax at apex; eyes prominent, frontal grooves very feeble, antennae short, less than two thirds the length of an elytron, outer joints compressed, as long as wide, terminal joint elongate. Thorax one fourth wider than long, three fourths the width of the elytra, base slightly narrower than the apex, transverse impressions distinct, median line fine, not much impressed, much abbreviated at the extremities; thorax widest at apical third, sides feebly arcuate anteriorly, anterior angles rounded, apex truncate, sides oblique and scarcely sinuate posteriorly, posterior angles distinct, subrectangular, scarcely carinate, basal foveae obsolescent. Elytra twice as long as wide, sides subparallel, humeri strongly rounded, apex suddenly rounded in apical third or fourth; disk with the sutural stria parallel and close to the side margin; eighth stria entire and deeply impressed throughout, impunctate. Discal foveae near basal and apical fifth. Length 2.4 mm., width .9 mm.

St. Petersburg, Fla., March 11, 1920.

Type (♂), Collection Bureau of Plant Industry. Paratype, Collection Notman.

This species is very distinct by its elongate and depressed form, narrow thorax, entire eighth elytral stria, and the absence of mental foveae. The eighth elytral stria is partially interrupted in *Tachyta nana* Gyll and related species, but in other respects, especially in the character of the integuments, this species seems properly placed in this genus, in which it should occupy a separate division.

Celia decora n. sp.

> Form oblong oval, a little narrower in front, convex, very shining in both sexes. Color dark piceous, palpi, antennae, legs, narrow margins of thorax and elytra and the posterior angles of the thorax pale. Head slightly transverse, a little more than one half the width of the thorax, frontal grooves short, narrow, convergent, extending to the clypeal suture, slightly impressed. Antennae extending to the base of the thorax, basal joints not carinate. Thorax about one half wider than long and four fifths as wide as the elytra, widest at the middle, arcuately narrowed anteriorly, subparallel posteriorly, apex truncate, three fourths the width of the base, posterior angles subobtuse, scarcely deplanate, median line fine, much abbreviated, basal area rugose, basal foveae double, rather indefinite, moderately deep, rather coarsely and sparsely punctate. Elytra scarcely wider at base than the base of the thorax, very slightly wider behind the middle, about two fifths longer than wide, sides feebly arcuate, strongly rounding in apical one third, striae fine but deep, intervals absolutely flat; scutellar stria moderately long, ocellate punctures of the eighth stria only slightly interrupted medially. Body beneath impunctate except for a few coarse punctures externally on the first ventral segment. Length 7.25–8 mm., width 3–3.5 mm.
>
> Male.—Prosternum with a deep round fovea.

Sabino Canyon, Ariz., March 29, 1920 (W. D. Edmonston).

Type and allotype (♂♀), Collection Bureau of Plant Industry.

Paratype (♀), Collection Notman.

This species repeats in *Celia* the male characters of the *insignis* group in *Amara*. It is related to *C. nupera* Horn and to *C. gibba* Lec. The thorax is less narrowed anteriorly than in *gibba*, but a little more so than in *nupera*. It is slightly smaller, less transverse, and more parallel than either. It is most closely related to *A. apachensis* Csy. It differs from that species by its proportionally smaller thorax, with the sides narrowed anteriorly from the middle—in *apachensis* the sides are strongly narrowed from the apical third—and by the male characters.

Europhilus antiquus n. sp.

> Form elongate, subparallel, slightly convex, moderately shining. Color black, elytra piceous, antennae and legs paler rufo-piceous. Head longer than wide, two thirds the width of the thorax, as wide as the thorax at apex, impunctate, surface finely alutaceous, rather dull; eyes large but not very convex, antennae slender, slightly more than one half the length of the body. Thorax impunctate, distinctly longer than wide, three fourths the width of the elytra, widest at apical third, sides evenly arcuate, base narrower than the apex, apex slightly emarginate, base truncate, posterior angles completely rounded, side margins broader and more reflexed posteriorly, basal foveae long, arcuate, linear but not sharp, prolonged anteriorly to the apical margin by more or less distinct lateral impressions, median line fine, distinctly impressed, nearly entire. Elytra nearly twice as long as wide, sides strongly rounded in basal sixth to the subangulate humeri, base as wide as the base of the thorax, sides subparallel to apical third, thence moderately arcuately narrowed to the subtruncate apices, striae fine and deep, intervals flat, the third with four small punctures. Tarsi not distinctly grooved. Beneath impunctate, metasternal side-pieces very elongate. Length 6.75 mm., width 2.25 mm. 1 ♂.

Lyme, Ct., August 5, 1911 (A. B. Champlain).

Type (♂), Collection of the Bureau of Plant Industry.

This species is related to *E. lenis* Dej. (*ruficornis* Lec.). It is distinguishable by the thorax widest nearer the apex and by the small, narrow, parallel-sided elytra with the apices more distinctly subtruncate. The third joint, only, of the antennae is slightly darker.

Selenophorus sinuaticollis n. sp.

> Form oblong, parallel, strongly convex; lustre dull, silken, integuments finely and evenly alutaceous, head and thorax slightly more shining. Color uniform, rather pale piceous with a feeble cupreo-iridescent shimmer, suture and apex pallescent. Head three fourths the width of the thorax, as wide as the thorax at apex, slightly transverse, very finely and feebly punctate in front, eyes small but prominent, frontal foveae punctiform, connected with the clypeal suture; anten-

nae short, slender, not reaching the base of the thorax, third joint longer than the second. Thorax about one half wider than long, five sixths the width of the elytra, widest at apical third, apex truncate, base feebly bisinuate, base and apex subequal in width, sides distinctly arcuately narrowed anteriorly, oblique and more or less distinctly sinuate posteriorly to the distinct, sharp and subobtuse posterior angles; base margined, transverse impressions feeble, basal foveae rather broad and feeble, rugulose, median line fine, more or less abbreviated, scarcely impressed, a few very faint punctures along the basal margin. Elytra about two fifths longer than wide, distinctly wider at base than the base of the thorax, humeral angles sharp, rectangular, subdentiform, sides parallel to apical third, thence strongly rounded to the apex, the latter scarcely visibly sinuate, marginal area at the apex finely pubescent; strial series of punctures minute, feebly impressed. Body beneath with numerous setae bearing punctures laterally, abdomen smooth medially, prosternum impunctate, tip of prosternum not margined. Hind tarsal joints triangular, pubescent, first joint equal in length to the next three. Length 7.5–8.5 mm., width 2.75–3.25 mm. 4♀.

Tucson, Ariz., July 21, 1913 (Shive).

Type and two paratypes, Collection Bureau of Plant Industry; paratype, Collection Notman.

This species is very distinct by its large size, sinuate thorax, recalling *Cratacanthus,* and the small strial punctures.

Stenomorphus convexior n. sp.

Form very elongate, parallel, subdepressed, shining, impunctate above and beneath. Color uniform dark piceo-rufous. Head about as long as wide, three fourths the width of the thorax, as wide as the thorax at apex; neck long, eyes small, convex, frontal foveae rather large and deep, connected with the clypeal suture. Clypeus rugose, finely and sparsely punctate, right mandible deeply strigose, black at apex; antennae moderate, not reaching the base of the thorax, joints less than twice as long as wide. Thorax about one fourth longer than wide, five sixths the width of the elytra, base distinctly narrower than the apex, disk evenly though not strongly convex from side to side, widest at apical one third to one fourth, slightly narrowed to the anterior angles which are rounded, apex and base emarginate, sides evenly arcuate, scarcely visibly sinuate in front of the strongly rounded basal angles, anterior transverse impression subobsolete, posterior more distinct, basal foveae linear, deep, one third the length of the thorax, a distinct depression along the outer edge, base strongly margined, median line fine, subentire, feebly depressed. Elytra twice as long as wide, less convex, base much wider than the base of the thorax, humeri rather narrowly but strongly rounded, sides very broadly arcuate and very slightly narrowed to apical fifth, thence sharply narrowed to the apex, apex distinctly sinuate, striae strong, impunctate, intervals strongly convex, ocellate punctures of eighth stria broadly interrupted medially. Posterior tibiae spinulose externally. Tarsi pubescent above, first joint as long as the next two, punctate above. Length 14 mm., width 4 mm. 1 ♀.

Tucson, Ariz. Type, Collection Bureau of Plant Industry.

This species is distinct by its short, evenly convex thorax with scarcely sinuate sides.

The following species of Staphylinidae were found in some material submitted for identification by Mr. E. L. Dickerson:

Bledius mixtus n. sp.

Form somewhat slender, convex, parallel. Color black, elytra rufous, with the scutellar area blackish, antennae and legs brownish testaceous. Head and thorax finely and densely reticulate and dull, head indistinctly and sparsely punctured, without transverse impression or distinct fovea on the vertex; thorax rather coarsely and closely punctured, median line faint; elytra and abdomen shining, the latter finely reticulate, elytra rather coarsely and closely punctured, abdominal segments punctured and pubescent laterally. Head as wide as the thorax, antennal tuberculations moderately distinct, antennae reaching the middle of the thorax, somewhat stout, second joint scarcely longer than the third but stouter, nine and ten transverse, about one third wider than long. Thorax one fourth wider than long, slightly narrower than the elytra at base, sides parallel and feebly arcuate anteriorly, oblique and scarcely arcuate behind the middle to the completely rounded and indistinct posterior angles, lateral angles not distinct. Elytra as long as wide and three fifths longer than the thorax, sides distinctly divergent posteriorly, abdomen nearly parallel, slightly narrower than the elytra. Coxal fissures of the prosternum closed, sutures nearly parallel to the side margins, hypomera scarcely concave. Length 3.75 mm., width .9 mm.

Type, Newark, N. J., April 27, Collection Notman.

Bledius dickersoni n. sp.

Form somewhat slender, convex, parallel. Color black, thorax piceous, elytra rather pale rufo-testaceous, scutellar area blackish; antennae and legs brownish-testaceous. Head and thorax densely and finely reticulate and dull, elytra and abdomen shining, the latter finely reticulate. Head indistinctly and sparsely punctate, thorax rather coarsely and closely punctate, median line distinct, strongly impressed. Elytra rather coarsely and closely punctured. Dorsal abdominal segments punctate and pubescent laterally. Head as wide as the thorax, vertex without transverse impression, median fovea indistinct, antennal tuberculations moderate, antennae attaining the middle of the thorax, rather stout, joints eight, nine and ten one half wider than long. Thorax as wide as long, slightly narrower than the base of the elytra, widest close to the anterior margin, sides nearly straight and slightly convergent to behind the middle, thence strongly narrowed to the completely rounded and indistinct basal angles, lateral angles not distinct. Elytra nearly as long as wide and one fourth longer than the thorax, sides distinctly divergent, abdomen parallel and slightly narrower than the elytra. Coxal fissures and prosternal sutures as in the preceding. Length 3.75 mm., width .9 mm.

Type, Newark, N. J., April 27, Collection Notman.

This species may be distinguished from the preceding by the form of the thorax, shorter elytra, stouter antennae, and strong median thoracic line. These two species belong in the group *semiferrugineus*. In the writer's synopsis recently published (Bull. Amer. Mus. Nat. Hist., XLII, p. 696) they should be placed with *B. piceus* Fall, from which they are distinguishable by the coarse punctuation of the thorax and larger elytra.

Pseudomedon cephalotes n. sp.

Form elongate, parallel, depressed. Color dark, castaneous, antennae, mouth parts, clypeus and legs paler rufous. Integuments densely and finely punctate and pubescent, dull in lustre. Head, omitting the mandibles, about as long as wide, very slightly wider than the thorax, widest near the base, the eyes small, distant nearly twice their diameters from the base, tempora distinctly swollen and divergent. Labrum edentate, with a small median emargination, gular sutures widely separated and divergent posteriorly. Thorax quadrate, sides straight, parallel, apex and base broadly arcuate, angles all rounded. Elytra rather large, one fourth longer than wide, slightly wider than the head, sides straight, very feebly divergent posteriorly. Abdomen as wide as the elytra, sides somewhat arcuate and attenuate posteriorly. Length 3 mm., width .6 mm.

Type, Newark, N. J., May, Collection Notman.

This species is very close to the European *P. obsoletum* Nord., two specimens of which are in the writer's collection. It differs in the head slightly wider than the thorax, with the tempora arcuate and divergent. In *obsoletum* the tempora are straight and parallel to the rounded posterior angles and the head is not wider than the thorax. The elytra, also, are larger in *P. cephalotes* and proportionally wider, being distinctly wider than the thorax at the humeri, scarcely so in *obsoletum*.

Genus **Anaduosternum** n. gen.

Maxillary palpi four-jointed with the second and third joints of equal length, the third rather feebly incrassate but stouter than the second, fourth joint subulate, slender, very short, about one fourth the length of the third. Labial palpi with the joints elongate, not differing much in thickness, the first and third longer, the latter more slender. Ligula divided to the middle. Mentum trapezoidal, strongly transverse.

Head large, slightly transverse, wider behind the eyes, infralateral carinae lacking, antennae moderately long, distinctly incrassate, outer joints transverse.

Thorax large, convex, without discal impression, hypomera strongly inflexed and invisible from the sides.

Elytra short and transverse, without distinct apical sinuses.

Abdomen broad, scarcely attenuate posteriorly, evenly, densely and finely punctate and pubescent, first dorsal segment only with a transverse basal impression.

Intermediate coxae contiguous for nearly a half of their length, mesosternal projection scarcely reaching the middle, acute at apex.

Tarsi 4–5–5-jointed, three basal joints of the anterior tarsi elongate, equal, fourth as long as the two preceding, posterior tarsi with the basal joint very elongate, longer than the fifth, longer than the next two together.

This genus resembles *Oxypoda* in the very elongate basal joint of the posterior tarsi. The elytra are, however, without apical sinuses and the anterior tarsi are four-jointed. It differs from *Acrotona* and *Colpodota* by the form of the posterior tarsi and the absence of the cephalic carinae.

The Myrmedoniid subgenus *Athetalia* Csy. (Mem. Col., I, p. 14) of the genus *Atheta* is described as having posterior tarsi with elongate basal joints, but the elytra are said to be long, the cephalic carinae well developed, the mesosternal projection long, and the thoracic hypomera visible from the sides.

Anaduosternum brevipennis n. sp.

Form rather short, stout and parallel. Color black, thorax piceous, antennae, legs and elytra paler. Thorax and elytra finely and densely punctate and pubescent, feebly shining, head more shining, less densely punctate. Head nearly three fourths the width of the thorax, with a feeble impression on the front lacking in one specimen, tempora two thirds the diameter of the eye and slightly more prominent, rounded. Antennae long and rather thick, reaching the base of the thorax, second and third joints elongate, equal, fourth as long as wide, tenth slightly transverse, eleventh as long as the two preceding, obtusely pointed. Thorax large, one third wider than long, wider than the elytral humeri and fully as wide as the apex, thorax slightly narrower at apex, with the sides strongly rounded. Elytral suture slightly shorter than the thorax. Abdomen as wide as the elytra, margins thick basally, the apex of the fifth segment scarcely narrower than the basal segment, not including the side margins. Length 1.7–2 mm., width .5–.6 mm.

Type and 1 paratype, Newark, N. J., July 24; 1 paratype, Newark, N. J., August 14, Collection Notman.

Heteroderes nicholsi n. sp.

Form rather short and robust, somewhat depressed and attenuate posteriorly. Color dark piceous, legs and antennae paler fusco-piceous. Head and thorax densely and finely granulose punctate with larger punctures evenly intermingled, lustre very dull, elytra more shining, striae deep with strong elongate punctures, intervals convex, finely and indistinctly punctulate. Pubescence fine and dense, pale brownish. Head about one half the width of the thorax, antennae reaching the base of the thorax but not the posterior angles, third joint twice as long as the second, a little shorter than the fourth, outer joints elongate and feebly serrate, prosternal sutures excavated in front, straight and convergent basally. Thorax as wide as long, omitting the posterior angles, as wide or slightly wider than the elytra, sides parallel and straight, suddenly and strongly rounded and narrowed near the anterior angles, very feebly sinuate before the posterior angles which are scarcely divaricate, the latter distinctly bicarinate, the inner about one third the length of the outer which is long. Elytra more than twice as long as wide and twice the length of the thorax, sides evenly arcuate, becoming attenuate behind the middle. Fourth tarsal joint with distinct lamella. Coxal plates obliquely truncate at the trochanter, suddenly narrowed externally. Length 8.2 mm., width 2.5 mm. 1 specimen.

Type, Jacksonville, Fla., March 26, 1919 (town under chip), Collection American Museum of Natural History.

This Elaterid is distinguishable from *H. sordidus* Lec. by its parallel-sided thorax with the posterior angles bicarinate and scarcely divaricate. Collected by Mr. J. T. Nichols.

A NEW GENUS OF HELOMYZIDAE.

By J. M. Aldrich, U. S. National Museum.

Lutomyia n. gen.

Allied to *Leria* but differing in venation. The first longitudinal vein is short, the auxiliary not very far removed from it at apex, although distinct; the second longitudinal curved strongly forward, joining costa at a very acute angle only a little beyond the apex of first. It does not make an immediate fusion with the costa, but lies in contact with it for a considerable distance, gradually blending as far as the last fourth of the length of the wing, from which point to the end of the fourth vein the costa is smaller. The anterior cross-vein lies at the very base of the discal cell, so that the first posterior cell is only a little longer than the second; hind cross-vein vertical, less than its length from the border. The abdomen has a peculiar thin, projecting margin along the sides and behind; there are five distinct visible segments. The thoracic chaetotaxy is as follows: dorsocentral four, humeral one, presutural one, notopleural two, propleural one, supraalar one, postalar two, prescutellar two, scutellar two pairs, sternopleural one, prosternals none, middle tibia without bristles except apically.

Lutomyia spurca n. sp.

Color uniform dark yellow, approaching ferrugineous, with faint traces of a dark stripe on the dorsocentrals and a slight darkening of ocellar triangle. Front considerably wider than half the head, the median part much more red than the orbits; ocellars large, postvertical distinctly convergent; verticals large; orbitals two, the posterior large, inclined slightly outward, the anterior arising close to it, half as large, inclined outward; third joint of antennae missing, the basal joints dark red; proboscis and palpi yellow, the former large, the mouth cavity of corresponding size; bucca about equal to eye-height, bare except below; eye not quite round, rather oblique, small; hairs of mesonotum abundant, black; pleurae wholly bare except a few small hairs on mesopleura at anterior angle, and some scattering hairs on sternopleura, which become denser and more spinose below; front legs missing in the specimen except the coxae, which are stout; middle femur with small bristles on anterior side arranged in three broken rows; middle tibia stout, with several bristles at apex and one subapical; hind femur much thickened and considerably curved, with an oblique subapical row of four bristles above; on the hind side below with a row of very slanting and very stout black spines extending the whole length, about ten in all; tibiae stout, curved a little at base, with distinct subapical bristle and one on the outer side at apex; tarsi not darkened, the hind basitarsus about as long as the two following joints; wing distinctly and evenly infuscated; the costal spines of medium size. Length 6 mm.

One male, Ithaca, N. Y., October, 1914, collected by Professor O. A. Johannsen. Type, male, Cat. No. 25314, U. S. Nat. Mus.

ISOPARCE CUPRESSI R. & J.

By W. C. Dukes, Mobile, Ala.

During the late summer of 1912, the writer was fortunate in taking two or three specimens of this rare Sphinx collecting under the arc lights in the suburbs of the City, but as is often the case, the specimens were in poor condition.

However, it established the fact that this species was present and knowing its food plant, the problem was to secure either its larvae or pupae.

The cypress (*Taxodium distichum*) grows in the midst of our swamps and its buttressed trunk is nearly always under water, its straight, graduated body being free of branches for twenty or thirty feet, making the search for larvae an almost impossible task.

In thinking over the subject, it occurred to the writer, that as far as his observation and experience went, the larvae of the Sphingiidae being peculiarly susceptible to parasitism, the caterpillars in descending the tree would want to "get under cover" as soon as possible, and would likely avail themselves of the crevices on the trunk of the tree, *just above the water-line.*

Acting upon this theory, the soft bark was carefully lifted, and all crevices investigated, with the result of finding several pupae snugly embedded in the cracks and inner bark.

The pupae, which showed no evidences of a proboscis sheath, were put into quart fruit jars with some of the bark crumbled and moss above, to furnish the necessary moisture.

The first emergence, March 10th, 1922, proved to be the desired species.

Brief Notes are always in demand by this Bulletin. We can use two or three in each number. They should range between three and a dozen lines—35 to 125 words.

THE DRAGONFLY EPICORDULIA REGINA.

By Wm. T. Davis, Staten Island, N. Y.

On April 30, 1912, while at South Bay, Lake Okeechobee, Florida, the writer collected a fine male *Epicordulia regina* Selys, generally considered by authors to be the same as *Epicordulia princeps* Hagen. The specimen has been submitted to Mr. E. B. Williamson, who thinks that some record should be made of it, and accordingly it is figured on the accompanying plate. It expands 99 millimeters.

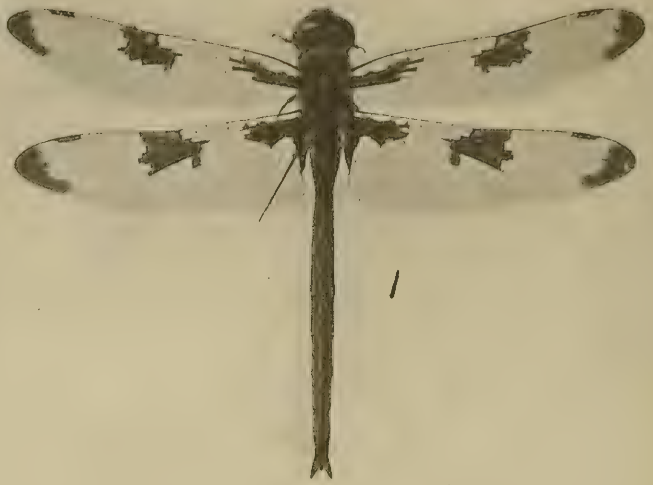
Dr. Philip P. Calvert has kindly shown me two male examples of *regina* in his collection. One came from Levy Co., Fla., April 24 (P. Laurent), and expands 104 millimeters, while the other was taken at Enterprise, Fla., April 15, 1896, by Dr. Castle and expands 109 millimeters. In the collection of the Museum of Comparative Zoölogy, Cambridge, Mass., there is a male *regina* from Lake Harney, Fla., May 4.

These four specimens are all larger than any of the fourteen examples of *princeps* in the writer's collection from New York, New Jersey, Virginia, and Iowa; also larger than the seven specimens shown me by Dr. Calvert from Maine, Massachusetts, Pennsylvania, and Texas.

In the examples of *regina* examined the spots on the wings are more drawn out than in *princeps;* especially is this true of the nodal spot, which is deeper in proportion to its length in *princeps* than the same spot in any of the specimens of *regina* so far seen. Also the terminal spot is more extended toward the base of the wing on the hind margin in *regina* than in *princeps.* On the same plate with the male *regina* is shown a male *princeps* taken at Singac, N. J., June 15, which was chosen because it is marked more nearly like *regina* than any other specimen in the writer's collection, but the differences already mentioned will be noted.

In his *Synopsis of the Neuroptera of North America* (1861), Dr. Hagen states at the end of his description of *Epitheca princeps:*

> "A large specimen (♂) from Georgia, has 72 millims. length; alar expanse 102 millim., the fuscous spots of the wings are broader but it is hardly distinct."



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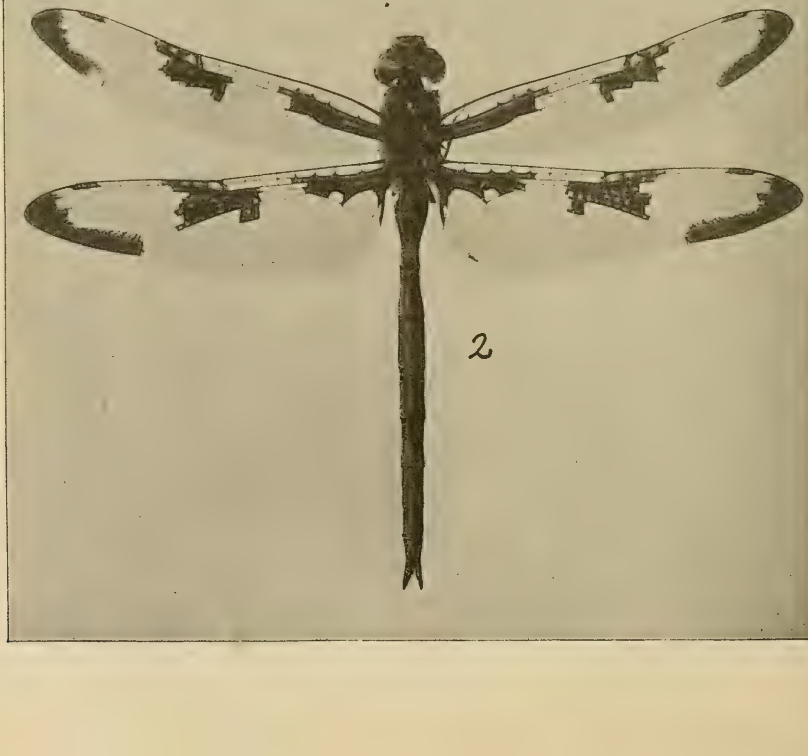

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This no doubt referred to what was ten years later named *regina* by Selys. His description was published in the Bulletin of the Royal Academy of Sciences, Letters and Fine Arts of Belgium (2) 31, p. 277, 1871. The measurements given of a male are: length of abdomen 54, inferior wing 47 millimeters, almost exactly those of the Florida example in the writer's collection. The type apparently was from Georgia, but other specimens are mentioned as having been examined by the author and Dr. Hagen. Particular attention is called to the greater size of *regina,* also to the fact that the brown spots on the wings are more extended:

> "The basal passes a little beyond the level of the triangle on the superior (without occupying it), the nodal equally enlarged and prolonged arcuately on the inferior wings along the short sector, so as to approach the hind margin, and the apical, in running along the hind margin almost touches the prolongation of the nodal."

"Race ? *Cordulia regina* Hagen" is the caption under which Selys recorded these specimens, and then surmises that when more is known they may be considered distinct from *princeps.* The present writer thinks that *regina* should not be placed as a synonym of *princeps,* as is generally done, but should be given at least the rank of a race, and perhaps that of a species. This seems to be justified from an examination of the specimens and the fact that no intermediate examples have been found.

EXPLANATION OF PLATE.

FIG. 1. *Epicordulia princeps* Hagen. New Jersey.
FIG. 2. *Epicordulia regina* Selys. Lake Okeechobee, Fla.

Dr. Charles P. Alexander announces that his address is now Fernald Hall, Mass. Agr. College, Amherst, Mass., where all communications to him should be directed.

NOTES ON THE LIFE HISTORIES OF NORTH AMERICAN CATOCALAE, WITH DESCRIPTION OF TWO NEW FORMS.

By T. D. Mayfield, Newark, N. J.

In offering the following notes on the early stages of a number of species of Catocalae I wish to state that breeding experiments conducted by me during the past two seasons bring me to the conclusion that *C. gracilis* Edwards and *C. sordida* Grote are distinct species, and that both are closely allied to *C. andromedae* Guenée.

Barnes and McDunnough, in the classification of this genus (1917, Check List), have placed *andromedae* directly after *gracilis,* and, they say in part (1918, Illustrations of North American Catocalae, p. 36) "that the similarity of the maculation of the primaries as well as structural characters of the two species leads to this belief." Subsequently my friend Mr. C. Rummel (1919, Bull. Brooklyn Ent. Soc., XIV, p. 103) accidentally came across the larvae of both species on the same food plant; and my breeding experiments are conclusive proof of the correct association of the two.

I take this opportunity of expressing my thanks to Messrs. J. B. and C. J. Paine, of Boston, who have very kindly furnished me with ova of various species.

Catocala andromedae Guenée.

> *Ovum.*—Rather more than hemispherical; strongly ribbed vertically with about 28 ribs arising at base of egg, about 17 of which reach the micropylar area, the remainder extending only slightly above the equatorial zone and rarely branching; micropyle composed of very minute cells encircled by a rather irregular row of slightly larger cells surrounded by a slightly raised rim; base flat; color brown, with a narrow, well-defined circumferent band of yellowish encircling the egg just above the equatorial region. There is considerable color variation in the ova, even from the same female, the color ranging from a yellowish to a purplish brown, with the darker shades predominating. Diameter, 1.2 mm.

Larva.—Stage I.—Head ochreous. Body greenish yellow with faint yellowish brown longitudinal lines, most strongly pronounced on the last four abdominal segments; tubercles brown, inconspicuous, with sparse setae; ventral surface with the usual dark patches well pronounced. Length, 4.5 mm.

Stage II.—Head ochreous, lined longitudinally with brown. Body gray, with two pale lateral stripes edged with the brown lines of preceding stage, and a similar rather indistinct spiracular stripe; a pale germinate dorsal stripe enclosing dark patches; fifth abdominal segment darker than others and slightly swollen dorsally; tubercles black, encircled by a dark band at base; ventral surface with the dark patches on each segment. Length, 9.5 mm.

Stage III.—Head whitish, marked frontally with longitudinal brown lines; sides of lobes striated with pale brown. Body ochreous, with three pale lateral lines edged with brown, and similar subdorsal and subspiracular lines; the area between the subdorsal and upper lateral lines is darker than the general color of body, as is also the subspiracular area; dorsal area with pale geminate line enclosing indistinct diamond patches of brown; fifth abdominal segment with dorsal wart of dark brown tipped with orange, dark brown transverse patch posterior to this wart extending to sublateral area; dorsal tubercles on seventh and eighth abdominal segments tipped with orange, very prominent on eighth segment with a dark brown oblique dash behind; other tubercles black; ventral area whitish with the usual brown patches on each segment. Length, 17 mm.

Stage IV.—Very similar to the preceding stage, but with the lines more contrasting; dorsal tubercles orange; wart on fifth abdominal segment very prominent, dark brown tipped with orange shaded laterally with paler brown; sparse whitish lateral filaments present. Length, 23 mm.

Stage V.—Head whitish shaded with orange at apex, lined longitudinally with brown, the most prominent of which are a more or less geminate line descending from the prothorax over apices of lobes to mouth parts paralleled inwardly with a similar line terminating a little below apex of clypeus; and a border line arising at the palpi ascending to apex of lobes which are heavily striated with brown. There is a dark streak through center of clypeus. Body gray; lines as in stage III, but a trifle more pronounced than in preceding stage owing to the more contrasting border lines; the dark subdorsal area accentuating the dorsal patches; wart on fifth abdominal segment not as prominent as in preceding stage, dark orange shaded posteriorly with paler color and gradually diminishing as the larva approaches maturity; dorsal tubercles orange encircled with whitish at base, other tubercles whitish; the oblique dash behind tubercle II of eighth abdominal segment is scarcely distinguishable; sparse whitish lateral filaments; ventral surface greenish white, patches brown. Length, full grown, 45 to 50 mm.

Food plant.—Various species of Huckleberry (*Vaccinium* spp.).

Catocala gracilis Edwards.

This description is drawn up from ova secured from a number of females captured at Lakehurst, N. J., including both *gracilis* and *sordida* forms. No effort was made to separate the two forms and all the ova were put together; subsequently after rearing the larvae through the third stage I discovered that two species evidently were involved. Fortunately the larvae all emerged at practically the same time, thus rendering separation a comparatively easy matter. This was promptly done and from then on the larvae were bred apart.

Further breeding experiments from authoritatively identified females will therefore be necessary to fully establish the ovum and first three larval stages.

I am appending herewith the full notes as recorded which will tend to show the close relationship this species bears to *andromedae*.

Ovum.—Strikingly similar to that of *andromedae;* in fact, so much so as to be scarcely distinguishable; it is, however, a trifle smaller, and viewed laterally tapers slightly from the equatorial region toward apex; the yellowish circumferential band is broad and irregular and does not completely encircle the egg as is the case with *andromedae.* This character seems to be constant. The same color variations have been observed as in *andromedae.* Diameter, .9 mm.

Larva.—Stage I.—Head brown. Body greenish gray with three brown lateral lines; tubercles brown with short setae; ventral surface with the dark patches rather enlarged. This larva closely resembles the young larva of *andromedae,* being a trifle smaller and darker in general color. Length, 4 mm.

Stage II.—Head whitish with longitudinal brown lines. Body dark greenish gray with three brown lateral lines and a similar subspiracular line; a rather indistinct, geminate, pale dorsal line; tubercles black with short setae; patches on ventral surface contiguous. Length, 8 mm.

Stage III.—Head whitish with dark brown lines, most prominent of which is a broad lateral line arising at apices of lobes, diminishing to a hair line at palpi, and a dark dash above apex of clypeus. Body greenish, with two pale lateral lines edged with brown and a similar spiracular line; a pale geminate dorsal line edged with brown enclosing light and dark patches; a broad brown black transverse patch on posterior of fifth abdominal segment (this segment is slightly swollen dorsally), extending down between the prolegs; the greenish ground color each side of this patch is lighter in color than rest of body, making the transverse patch stand out very prominent; the subdorsal area has the appearance of a dark stripe, edged with dark brown lines; these are the border lines of the dorsal and upper lateral lines and are confluent on posterior edge of first four abdominal segments forming conspicuous, arrow-like spots with the apex to posterior of body; a broad black crescent on eleventh segment behind tubercle II; tubercles black; ventral area with dark brown contiguous patches; legs brown; prolegs whitish, conspicuous, with a dark brown lateral line. There is considerable color variation in different individuals, the general color ranging from greenish to a warm yellowish brown. It is also noted that the lines on head do not appear to be constant, nor are the ventral spots always connected. The head of some individuals is as above described, while others have a dark furcate border line arising at palpi, ascending to apices of lobes. Length, 15 mm.

The differences noted in stage III, in the lines of the head and of the ventral spots, seemed to indicate that two species were involved, but not until after the third moult, when some of the larvae showed the presence of lateral filaments, while others had no trace of any, was there conclusive evidence that two species were under observation. After the larvae had been separated according to the presence or absence of the filaments it was at once observed that the inconstancy of the head lines and of the ventral spots had also devolved into two forms, the one with the filaments and the other without this characteristic feature. This established beyond doubt two distinct species; close observation was then made of both forms.

C. gracilis Edwards.

Stage IV.—Head whitish, with a dark brown furcate line beginning at palpi ascending along border of lobes, evanescent at apices; a dark line arising slightly above the region of the ocelli ascending toward lobes, angled inward, and terminating in an obtuse hook near apex of lobe. Body gray, sprinkled with brown dots; a pale geminate dorsal line enclosing light and dark patches of brown through which runs a darker centro-dorsal line; a dark subdorsal stripe edged with dark lines coalescing on posterior of first four abdominal segments, forming dark sagittate spots similar to those of the preceding stage but less pronounced; just below tubercle II is a broad lateral stripe filled with indistinct wavy lines; below spiracles a pale geminate line; subspiracular area darker than above; small ochreous wart dorsally on fifth abdominal segment posterior to which is a broad brown black transverse patch; tubercle II of eighth abdominal segment prominent with the usual oblique dash behind it; ventral area greenish white with dark brown patches on each segment; sparse whitish lateral filaments present. Length, 22 mm.

Stage V.—Head as in preceding stage but slightly tinged with ochreous apically. Body brown covered with blackish dots; lines of preceding stage present but less distinct owing to the heavy sprinkling of the dark dots; the transverse patch on the fifth abdominal segment is only faintly visible; the wart on this segment small, ochreous; tubercle II prominent, especially so on fifth, eighth and ninth body segments, reddish tipped with orange and with a white spot dorsally at base; other tubercles ochreous arising from a whitish base; the oblique dash behind tubercle II on eighth abdominal segment quite pronounced; prolegs concolorous with body; ventral surface whitish tinged with green, brown patches on each segment; sparse lateral filaments. The full-grown larva intimately resembles that of *andromedae*. Length, full grown, 45 to 50 mm.

Food plant.—Huckleberry (*Vaccinium*).

Catocala sordida Grote.

As already noted, further breeding experiments will be necessary to distinguish the earlier stages from that of *gracilis;* the ovum and first three larval stages are very similar; the last two stages, however, show decided points of distinction, amply proving the species to be entitled to specific rank.

Larva.—Stage IV.—Head whitish with a dark brown lateral line, broadest at apex of lobes, broken into striations at the epicranium; frontally a dark longitudinal line arising in the region of the ocelli ascending to apex of lobes, and a well-defined line subparallel with clypeus branching near apex of same, merging with the longitudinal line outwardly, the inner branch ascending irregularly to prothorax; a dark central dash through lower portion of clypeus and a streak along suture dividing the lobes. Body gray, heavily sprinkled with brown dots; a pale geminate dorsal line enclosing light and dark patches, lightest on posterior edge of segments, the dorsal area appearing as a light streak, paralleled by a dark subdorsal stripe edged with darker lines, coalescing on posterior of segments, forming dark brown sagittate markings with apex to posterior of body; below this are two light geminate wavy lateral lines, and a dark wavy spiracular stripe with a darker line along upper edge; subspiracular area darker than above and with darker deltoid patches on each segment; prominent light brown dorsal wart on fifth abdominal segment, a dark brown transverse patch on posterior of this segment usually extending to anterior portion of sixth abdominal segment; this dark patch is relieved on either side by extremely light patches, making the darker patch stand out very prominent; a dark crescent always present posterior to tubercle II on eighth abdominal segment; tubercles orange; prolegs whitish, conspicuous; ventral area whitish with the dark patches contiguous; no filaments. During this stage considerable color variation appears in different individuals, which increases as the larvae approach the end of the instar and begin to bear the markings which they carry to maturity. Length, 18 mm.

Stage V.—Head small, whitish tinted with orange at apices of lobes; lines much as before faintly striated at apex and sides of lobes. Body color ranges from a pale ochreous to gray, heavily sprinkled with dark dots, making the general color range from ochreous through yellowish browns to almost a brown black or dark gray; the lines, however, are constant though varying in color with the body color and are less distinct than in preceding stage; this is the most variable larvae the writer has observed with the possible exception of the Myrica-feeders; there is always present a dark subdorsal stripe bordered by darker lines; this stripe is very conspicuous on thoracic segments, being accentuated by the light dorsal area and the more or less broken lateral stripe of pale color which in some instances is almost white on fourth, fifth and sixth abdominal segments, these light patches often extending to the subspiracular area; the subspiracular area is darker than above with the triangular patches as in preceding stage; wart on fifth abdominal segment small, usually orange, posterior to which and anteriorally on sixth segment is the dark transverse patch of preceding stage extending down between the prolegs; this dark patch is always well pronounced, ranging in color from brown in the light forms to almost black in the darker forms; tubercles ochreous to orange; tubercle II of eighth abdominal segment prominent, with a dark crescent behind; ventral surface whitish with dark brown contiguous patches; prolegs whitish, conspicuous, with dark lateral lines; no filaments. Length, full grown, 42 to 45 mm.

Food plant.—Various kinds of Huckleberry (*Vaccinium* spp.).

(*To be continued.*)

DISTRIBUTIONAL RECORDS OF AQUATIC HEMIPTERA.

By J. R. de la Torre-Bueno, White Plains, N. Y.

Collectors and students of Hemiptera, while more numerous now than ten years ago, are still but too few; and the published distribution of the Heteroptera is still far too fragmentary to base generalizations upon. The records here given are from specimens in the Cornell University collection, and fill gaps in the distribution, not only in New York, but also in the United States at large. For convenience, the arrangement is according to Van Duzee's *Catalogue:*

Mesovelia bisignata Uhler—Ithaca, N. Y.

Gerris conformis Uhler—Ithaca, N. Y.

Gerris marginatus Say—New York: Ithaca, Old Forge, Adirondack Mts.; Michigan: Walnut Lake.

Gerris buenoi Kirkaldy—Ithaca, N. Y.; Lake Forest, Ills. These two States are not given by Van Duzee.

Gerris canaliculatus Say—Knoxville, Tenn. Another record additional.

Gerris rufoscutellatus Latreille—New York: Ithaca, Enfield Falls, Old Forge; California: Mt. Diablo, Fresno Co., Palo Alto; Lake Forest, Ills. California is the most Western record for the species; not given by Van Duzee.

Metrobates hesperius Uhler—New York: Ithaca, Adirondack Mts.; Knoxville, Tenn. The Tennessee record is not in Van Duzee.

Trepobates pictus H. S.—Ithaca, N. Y.; Knoxville, Tenn.

Halobates micans Eschsch.—Lat. 23° 58′ N., long. 81° 8′ W. (Between Florida and Cuba.)

Microvelia americana Uhler—Saranac Lake, N. Y.

Rhagovelia obesa Uhler—Ithaca, N. Y.

Notonecta irrorata Uhler—New York: Ithaca, Spencer Summit; Wellington, Ohio; North Carolina. The last State does not appear in Van Duzee.

Ranatra protensa Montandon—Ithaca, N. Y.

Ranatra americana Montandon—Columbia, Mo. A record not in Van Duzee.

It may be noted that the arrangement of families in the water bugs, according to Van Duzee's Catalogue, does not seem to me to show the true relationship of the groups. It is too discrete. Likewise, it may be noted that *Ranatra grisea* Bueno MS. is a strict synonym of *R. protensa* Mont. In fact, all the records given under *Ranatra* in the Catalogue are uncertain, owing to erroneous synonymy, following Montandon. These are the correct synonymies according to our present knowledge:

Ranatra fusca P. B. = *nigra* H. S.

R. americana Mont. = *quadridentata* Uhler and American authors, not Stål = *quadrinotata* Van Duzee (as a synonym) lapsus calami.

R. protensa Mont. = *grisea* Bueno MS.

R. kirkaldyi Bueno is not a synonym of *fusca* P. B., but a very distinct species, easily separable by striking structural characters from all our other species, and, in fact, from almost all other species of the genus.

DESCRIPTIONS OF TWO NEW SPECIES OF AEGERIIDAE (LEP.).

By William Barnes, M.D., and A. W. Lindsey, Ph.D.,
Decatur, Ill.

Paranthrene fenestratus n. sp.

Head, body and appendages black; apical portion of antennae orange.

Wings orange with gray-brown fringes, the ground color deeper in the cells. Costa of primaries to end of cell, base, radial and cubital stems and inner margin near base marked with black. Inner margin and 2d A of secondaries black, some other veins with a few black scales. Secondaries with naked, transparent areas as follows: a triangular area between 2d A and 3d A, a very elongate, partly scaly area between 1st A and 2d A, a long area almost filling the space between Cu_2 and 1st A, and small triangular areas between Cu_2, Cu_1 and M_3. Expanse 45 mm.

Holotype ♀, Chiricahua Mts., Cochise Co., Ariz., June 8–15, in coll. Barnes.

The superficial appearance of this species suggests *Alcathoe korites* Druce.

Melittia superba n. sp.

Head and thorax dull greenish gray, collar and tips of patagia with some yellow hairs. Palpi yellow, paler beneath. Antennae black. Abdomen yellowish white beneath, with some black on posterior margins of segments. Dorsal surface of first two and fourth segments yellow with black bands across hind margins; third, fifth and sixth white, also with black hind margins, remainder blue-black. Fore legs yellow, tibiae and tarsi lightly tipped with black. Middle legs yellow, femora touched with black on one side, tibiae with black at tip and reddish orange on one side; tarsi mostly black with some yellow at bases of segments. Hind femora black with orange below in distal half and yellow toward tips. Hind tibiae reddish orange, replaced by black in outer two fifths above and with yellow or whitish along outside. This yellow stripe is marked with black at base and crossed by black bands beyond, one at base of first pair of spurs and one before. Spurs black, outer with white and orange and inner with orange scales along outer margins. First joint of tarsus black, orange within in

> basal half, in continuity with orange of tibia. Outside with some yellowish scales. Remainder of tarsi black. All black on legs and tip of abdomen with a beautiful blue metallic luster.
>
> Primaries a peculiar shade of dull gray-green, in most of the types with a slight yellowish dash at base. Basal half of fringes pale fuscous along outer margin; fringes otherwise ochre yellow. Hind wings transparent, clothed at base and along anal region with reddish-orange hairs. Veins marked with orange and some black scales. There is a black terminal line. Fringes pale fuscous, tipped with ochreous, and entirely ochreous, with only a few fuscous hairs in basal region. Expanse: ♂ 51 to 57 mm.; ♀ 63 to 65 mm.

Described from six specimens taken in Seward Co., Kansas. Holotype ♂, allotype, and one paratype of each sex in coll. Barnes. One paratype of each in coll. Engelhardt, Brooklyn Museum. A seventh specimen from San Bernardino Ranch, Cochise Co., Ariz. (Snow), appears to belong to this species, but its poor condition renders a conclusive judgment impossible.

Our series stood as *grandis* Strecker for some years, but a recent comparison of Texan specimens with the type of *grandis* (♀) in the Field Museum shows that the Kansan species is new. The yellow terminal half of the fringes of the primaries and the yellowish-white segments of the abdomen are the most evident points of difference. *Superba* is also much larger than *grandis*.

A Change of Name in Ischnodemus (Hemiptera, Lygaeidae).—I propose **Ischnodemus hesperius** nom. nov. to replace *Ischnodemus brevicornis* Parshley (Rept. Coll. Hem.-Het. South Dakota, Tech. Bull. 2, S. D. State College, p. 8, 1922). The latter must be considered preoccupied by *Micropus brevicornis* Stål (Öfv. Vet. Ak. Förh., XII, p. 35, 1855), which, according to Dr. Bergroth (*in litt.*), was unwarrantably altered by Stål to *curticornis* (Enum. Hem., IV, p. 131, 1874), and hence must be restored as *Ischnodemus brevicornis* Stål.—H. M. Parshley, Northampton, Mass.

THE INALIENABLE RIGHT OF AUTHORS TO SAY WHAT THEY PLEASE.

Science is free. It thrives only on freedom of discussion.

From this it necessarily follows that every author is entitled to have his brain children put before the world exactly as he sent them forth.

Many considerations flow from these two principles as to the respective duties, rights and privileges of authors and editors.

An author may write on any subject in any way that pleases him. But he must use correct English; he must have something to say; he must say it briefly. He must not send a shilling shocker to our staid publication, nor a dichotomy of *Anthrenus* to Snappy Tales. And, above all, he must not expect an editor to say "Thank you, kind sir" every time and to publish what is so amicably sent without any further discussion.

And authors must be human, like editors.

Editors, added unto them, have the happy privilege of getting in Dutch with the authors and sometimes with the readers. An editor, likewise, must have a policy—his own, or that of the organization for which he acts, and to that policy he must adhere. He must also be a suave diplomat, fit to cope with the lamented Prince de Talleyrand of happy memory. In addition, he must possess the every-day editorial qualities of omniscience, "a nose for news" and mechanical expertness in lay-out, make-up, and the other doodads that make the editor's life one joyous round.

In our entomological publications authors produce original research, which they are entitled to present in their own way and in their own choice of words. An editor receiving an entomological article can do only one of two things. He can accept "as is," or he can reject. The only criteria are the policy of the journal or the judgment of the editor. And the author may not go behind the face of the rejection; he is obliged to accept it as set forth.

On the other hand, an article once accepted still remains the intellectual property of the author. No editor has any right to change it in any material way. Here and there capitalization may be changed to conform to the standard of the journal or obvious *lapsi calami* made straight. But no changes to explain or make clear obscurities should be dared by an editor. If the author's style is turgid (or turbid), let each reader interpret it for himself. No editor has any right to inject his own thoughts into another's work. If an article should unfortunately be too unintelligible, then the editor must return it as gracefully as he may.

But always and above all, every author is in full enjoyment of the inalienable right to say *what* he pleases and *as* he pleases, and stand for the consequences.

But an editor is not compelled to publish *quite* everything—nor too often.

J. R. T. B.

SILAS C. WHEAT.

Silas C. Wheat, an active member of both the Brooklyn and New York Entomological Societies for the past ten years, died at Middlebury, Vt., on Friday, September 1. Although nearly 70 years of age, he apparently was hale and hearty and enjoying a summer's vacation when he suffered a stroke, dying almost immediately.

Mr. Wheat was born at Franklin, Delaware County, N. Y., in 1853, where he graduated from the Franklin Academy, and then attended the New York University School of Pedagogy, qualifying as a teacher. He taught in New York City, was principal of a school at Madison, N. J., and since 1893 he has followed his profession in the public schools of Brooklyn, retiring in 1910.

While keenly interested in matters entomological, Mr. Wheat's real and life-long interest centered in Conchology, a field in which he attained lasting distinction through numerous and valuable contributions, published both here and abroad. His "Report on the Mollusks of New Jersey" for the State Museum at Trenton and a similar one on Long Island for the Brooklyn Institute of Arts and Sciences are still pending publication. By fellow members of the Entomological Societies, Mr. Wheat will be remembered most kindly for his steadfast loyalty and for much assistance in many ways.

G. P. E.

EXCHANGES.

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

MISSISSIPPI INSECTS.—Will collect in all orders. Correspondence solicited. Miss Sophie May Newbern, Cedar Bluff, Miss.

OFFER.—Bred adult specimen of *Catocala herodias* in exchange for ova of species of same genus. Parent moth with ovum preferred. G. J. Keller, 68 Treacy Ave., Newark, N. J.

WANTED.—Records N. Y. State Rhopalocera for check-list, all species and localities desired for a table showing the distribution throughout the State. James L. Angle, Librarian Rochester Municipal Museum.

WANTED.—Offers on bright-colored butterflies and moths for use in trays and pictures. Mrs. Robert Milde, Lewiston, Minn.

ARKANSAS INSECTS.—Will collect Lepidoptera and other orders. Correspondence solicited. Miss Louise Knobel, 417 West 2d Ave., Hope, Ark.

WANTED.—Cynipidæ and their galls from all parts of the world. Exchange or cash. Western and Southern material particularly desired. Wm. Beutenmuller, Box 258, Highwood, Bergen Co., N. J.

WANTED.—Saldidæ, especially from the Western U. S. and Canada. Will name or give good exchange. J. R. de la Torre-Bueno, 11 North Broadway, White Plains, Westchester Co., N. Y.

WANTED.—Papers published since 1894 and containing references to American Coleoptera by Bernhauer, Grouvelle, Lesne, Leveille, Lewis, Pic, Otto Schwarz, Wasmann or other foreign authors. Will pay cash or give in exchange papers by American authors that I have in duplicate. C. W. Leng, No. 33 Murray St., New York City.

LOT of 100 South American butterflies and moths in perfect condition, papered, at $6.50; including *Morpho menelaus* or *cypris, Caligo*, 8 *Papilios*, 8 *Heliconius, Prepona, Perisamia, Catagramma, Calicore*, 4 *Apatura*, Nymphalidæ, *Urania*, Sphingidæ, etc., etc. H. S. Parish, 81 Robert St., Toronto, Can.

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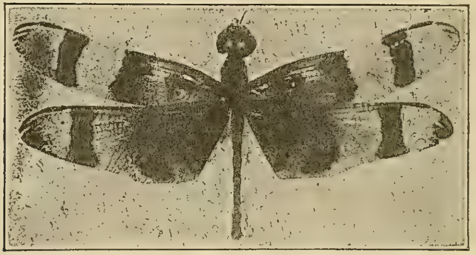

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Vol. XVII DECEMBER, 1922 No. 5

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

NEW SERIES

Smithsonian Institution
DEC 8 1922
National Museum

PUBLICATION COMMITTEE

J. R. de la TORRE-BUENO,
Editor

DR. J. BEQUAERT GEO. P. ENGELHARDT

Published by the Society

Price, 35 cents Subscription, $1.50 per year

Mailed December 6, 1922

Entered as second-class matter January 21, 1919, at the postoffice at Lancaster, Pa.,
under the Act of March 3, 1879

The Brooklyn Entomological Society

Meetings are held on the second Thursday after the first Tuesday of each month from October to June, inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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CONTENTS

A N. SP. OF AGALLIA, WITH NOTES ON OTHER CICADELLIDÆ, Olsen 127
PHYLLOPHAGA OF HAWTHORN, McColloch and Hayes 131
MIGRATION OF CERTAIN WATERSTRIDERS, Parshley 136
LIFE HISTORIES OF N. AM. CATOCALÆ, Mayfield 138
GEOCORIS PALLENS, A PREDACEOUS ENEMY OF THE FALSE CHINCH BUG, Milliken and Wadley 143
AMARANTH FLEA-BEETLE, Chittenden 147
DOLICHOPODIDÆ FROM SOURCES OF THE HUDSON RIVER, Bequaert 149
BOOK NOTES, J. R. T.-B. 150
PROCEEDINGS OF THE SOCIETY, Bequaert 152

Bulletin of the Brooklyn Entomological Society

Published in
February, April, June, October and December of each year

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11 North Broadway, White Plains, N. Y.

BULLETIN
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VOL. XVII DECEMBER, 1922 No. 5

A NEW SPECIES OF AGALLIA, WITH NOTES ON OTHER CICADELLIDAE.

By CHRIS E. OLSEN, West Nyack, N. Y.

Agallia lingulata n. sp.

Small dark form (the males nearly black) resembling *A. 4-punctata* and *A. constricta,* but with distinctly different genital segments in both sexes. Size ♂ 3.6 mm., ♀ 3.75 mm.

Male: Vertex short, less in length at the middle than next to the eyes; anterior margin tends to be slightly flattened at apex; the arched posterior margin slightly angled in the middle; expansion of vertex in back of eyes is very slight. *Pronotum* moderately long, scarcely more than twice as wide as long; posterior margin slightly sinuated; discal surface with faint indication of being transversely rugose. *Scutellum* a trifle wider at the base than the length of the lateral margins; apex is produced. *Elytra,* as viewed from above, slender, not spreading or widening much at the middle, and terminating in an acute point when closely folded (about as in *A. constricta*); much longer than abdomen; all above finely, evenly and distinctly granulate; nervures rather strongly raised. *Face* with the ledges over the antennae quite prominent; a shallow depression from the ocelli running obliquely out between the eyes and antennae; the edge of the ledge not prominently produced; front moderately long, lateral margins slightly but evenly rounded; lateral margins of clypeus parallel to where they meet the margins of the cheek, apex rectangular, a decided depression at either side of the suture between the clypeus and front. *Lorae* long and narrow, joining cheeks at apex. Lateral margins of cheeks suddenly swelling out just below the antennal sockets.

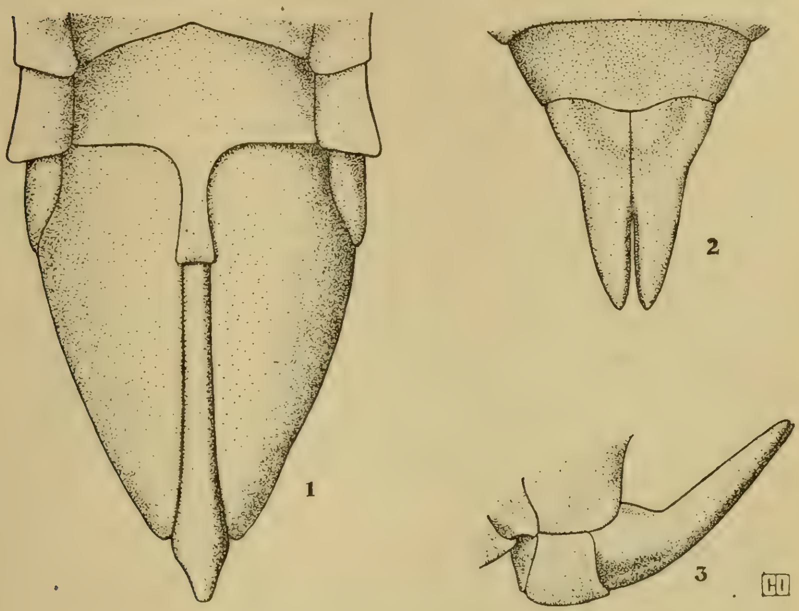
Color: Males variable, dark brown to nearly black; *vertex* with two large black spots surrounded by a lighter area which gradually darkens to a brown; a fuscous vitta on the center of vertex extending from base to the dark face, another on either side at the submargin of eyes extending from the base down to the dark face, broadening below the black spots, leaving a light ring around these; also leaving a light vitta from the upper edge of antennal ledge into and just below the ocelli; edge all around the eyes is pale; disk of face dark brown, nearly black, margins light; disk of front dark brown, central area slightly lighter, submargins lighter, margins dark; *clypeus* and *lorae* with a dark discal area; antennal sockets are black; the basal segment of *antenna* is pale, rest is dark, nearly black; *cheeks* washed with a dark brown. Anterior part of *pronotum* is dark brown; posterior with two large black spots, further apart than those on the vertex, and with a fuscous vitta between these, leaving a light band around each spot (in some specimens the rings of these spots are partly obscured). *Scutellum* black, with two whitish maculations on the lateral margins near apex. *Elytra* dark brown, nearly black, with a slight indication of pale nervures. *Female* in general much lighter in color, nearly approaching the color of *A. 4-punctata,* with four large, conspicuous black spots.

Genitalia: Male valve is hardly twice as broad as long, lateral margins enclosing the plates rather snugly; posterior margins bisinuate, leaving an obtuse point slightly farther produced than the apical ends of the lateral margins; plates continuing the lines of the lateral margins of the valve for little more than one third of their length from base, then their course is almost parallel, gradually curving inwards and ending in acute points, separated by a fissure a little more than a third in length from the apex; the points of the plates are convex and pointed upwards.

Female: Ultimate ventral segment broad, long and cylindrical; lateral margins are parallel; posterior margin truncated, with a long, narrow, lingulate projection, almost as long as the truncated portion of the segment, but only as wide as the visual part of the ovipositor; the lateral margins of this lingulate projection are almost parallel, but gradually curving at the base into the posterior margin of the segment, spreading a trifle posteriorly, making a broader apex which is truncated and with rugulae. The genital character is very distinctive and I have been unable to find any other species within the genus with genital characters similar to these.

Described from six males and one female taken by me at West Nyack, N. Y., May 30, 1921, and one female taken by Dr. F. E. Lutz at Ramsey, N. J., June 18, 1918.

Male holotype, female allotype, and five male paratypes in author's collection; one female and one male paratype in the collection of The American Museum of Natural History.



Genitalia of *Agallia lingulata.*

Agallia 4-punctata Prov.

One of our eminent entomologists mentioned, while he was examining my collection of leafhoppers, that he had seen very few males of that species in his many years of study in this group of insects. At that time I had among my identified insects of this species only a single male specimen from Batavia, N. Y., July, 1914, collected by Dr. H. H. Knight. Since then more of my material has been worked over and to my surprise I have come across many more males than my friend had ever seen. The localities where these males come from are as follows: Bayshore, N. Y., July, 1912, one specimen; Yaphank, N. Y., May, 1911, one specimen, July of the same year, seven specimens, and New Haven, Conn., September, 1911, one specimen. It may be noticed that most captures are single individuals, except in case of the seven, whereas the female is usually taken in great quantities. The males of this species are easily distinguished from the male of *A. constricta* Van Duzee by the plates of the genitalia not being constricted.

Driotura gammaroides var. **flava** Osborn and Ball.

A specimen of this variety was taken by the writer together with a number of the typical form at Hempstead, L. I., N. Y., July 21, 1909.

This variety appears to be a rather rare insect; it was briefly described in conjunction with a study of the typical form *gammaroides* by Osborn and Ball, and its distribution was not definitely separated from that form which evidently was studied from a large amount of material collected in four of the Central States. I must repeat here that it is very desirable indeed to have the locality of any form given separately from that of related forms and especially when describing new forms, so that type localities may be known.

Eutettix pictus Van Duzee.

Two specimens from Bayshore, N. Y., July 31, 1909, and one specimen from Hempstead, L. I., N. Y., July 21, 1909, by the writer.

Eutettix slossoni Van Duzee.

Several specimens were taken together with the previously mentioned, found at Bayshore, N. Y., July 31, 1909.

Neither of the two forms above has been recorded from the State, although they must have been collected.

Some authorities place these as varieties of *Eutettix subaeneus* Van Duzee, perhaps for some good reason.

Euscelis (Athysanus) stactogalus Fieber.

Mr. Edward Burns has recently published an account of having taken a number of this species on Tamarisk at Westerleigh, Staten Island, N. Y., on July 31, 1921, in an obscure publication as far as entomology is concerned. (Bull. Sta. Isl. Inst. Art Sci.) It is of importance to bring this to the attention of the entomologist in general, therefore, with apologies to Mr. Burns, the record is here repeated. It seems to indicate that this species is very likely to be met with wherever the Tamarisk is grown, and no doubt it causes considerable injury to these plants, as it usually occurs in very great numbers. In all probability, like other insects of foreign introduction, they have come here leaving their natural enemies behind.

I may add that the two trees, on which I previously found this insect so very abundant, were in such unhealthy condition that one of them was destroyed by a recent snowstorm. There is no doubt that these insects are partly responsible for the poor health of these particular trees.

THE PHYLLOPHAGA (SCARAB. COLEOP.) OF HAWTHORN (CRATAEGUS).[1]

By J. W. McColloch and Wm. P. Hayes, Kansas State Agricultural Experiment Station.

A study of the fauna of trees is always interesting and especially the different species of a single genus that inhabit a particular kind of tree. Quite often the different members of a generic group prefer different food plants and the occurrence of several species of one genus feeding on a single species of tree offers opportunity to study food preferences as exhibited by closely related forms. Such is the case with the May beetles (*Phyllophaga* spp.) on hawthorn (*Crataegus* spp.). For several years the writers have been studying the food habits of *Phyllophaga* in the vicinity of Manhattan, Kansas, and it is their intention to present from time to time short summaries of the fauna of the more important trees of the region.

---

[1] Contribution No. 80 from the Entomological Laboratory, Kansas State Agricultural College. This paper embodies some of the results obtained in the prosecution of project No. 100 of the Agricultural Experiment Station.

Forbes[2] presents some interesting data on the food habits of *Phyllophaga* in Illinois which offers opportunity to compare the food of the various species in Kansas and Illinois. A total of 73,656 May beetles were collected by him on various food plants from 1907 to 1913. Of these, 399 were taken on hawthorn, representing 25 collections with an average of 16 per collection. The writers, during the period of 1917 to 1920, inclusive, collected on various food plants 22,570 beetles, of which 4,071 were taken on two species of hawthorn (*Crataegus mollis* and *C. crus-galli*). The total of beetles taken represent 122 collections, or an average of 33.3 per collection. These are compared with the Illinois collection in Table I.

TABLE I.—COMPARISON OF KANSAS AND ILLINOIS COLLECTIONS.

Collection.	Period.	Total Beetles from All Food Plants.	Number Collections on Hawthorn.	Total Beetles on Hawthorn.	Average per Collection.	No. of Species Represented.	Per cent. of Hawthorn to Total Collections.
Illinois....	1907-13	73,656	25	399	16	9	.005
Kansas....	1917-20	22,570	122	4,071	33.3	10	18.00

From a food plant of relatively little importance in Illinois, as shown by less than 1 per cent. of the total collections, hawthorn in Kansas, with 18 per cent. of all collected beetles found on it, becomes an important food of May beetles. This, as will be shown later, is accounted for by the presence of *P. rubiginosa* in Kansas and its absence in Illinois. It should, however, be stated that the Illinois collection represents the State as a whole, while the Kansas collection was made only in the vicinity of Manhattan, Kansas.

During the four-year period the writers collected ten species of *Phyllophaga*, which rank in importance in the order named—*rubiginosa, futilis, rugosa, hirticula, vehemens, crenulata, crassissima, implicata, bipartita,* and *corrosa*. The total of all species collected on *Crataegus mollis* are shown in Table II. The 282 beetles not accounted for in Table II were taken on *C. crus-galli* and will be discussed later.

---

[2] Forbes, S. A., "A General Survey of the May-Beetles (*Phyllophaga*) of Illinois," Ill. Agr. Exp. Sta., Bull., 186, pp. 215–257, 1916.

TABLE II.—COLLECTIONS OF MAY BEETLES ON CRATAEGUS MOLLIS.

Species.	1917.	1918.	1919.	1920.	Total.
Rubiginosa	1,584	102	44	1,793	3,523
Futilis	35	9	21	96	161
Rugosa	19	4		23	46
Hirticula-comosa	15			30	45
Vehemens	1	1		3	5
Crenulata	2			1	3
Crassissima				2	2
Implicata				2	2
Bipartita				1	1
Corrosa				1	1
	1,656	116	65	1,952	3,789

The years 1917 and 1920 were the periods of flight of the major brood of beetles and the figures show well the three-year life cycle of *P. rubiginosa.* Approximately 93 per cent. of all beetles collected on *C. mollis* were of this species, the other 7 per cent. being composed of three relatively important species, *futilis, rugosa,* and *hirticula,* and six unimportant species.

Arranging the data as to number of collections, we find that of 122 made on hawthorn, 95 were made on *C. mollis,* while 27 were on *C. crus-galli.* The number of individuals and species in each set of yearly collections and the average per collection are shown in Table III.

TABLE III.—SHOWING NUMBER OF COLLECTIONS AND AVERAGE OF INDIVIDUALS COLLECTED.

Species of Trees.	Year.	Number of Collections.	Number of Species Collected.	Number of Individuals Taken.	Average per Collection.
C. mollis	1917	34	6	1,656	48
	1918	22	4	116	5
	1919	20	2	65	3
	1920	19	10	1,952	102
Total		95	10	3,789	40
C. crus-galli	1917	27	7	282	10
Total of both trees		122		4,071	33

The average number of individuals per collection varied from 3 to 102, depending on the years of abundance and the number of species collected. Comparing the collection on two trees in 1917 with that on one tree in 1920, the numbers are 1,938 and 1,952, or nearly equal.

The 1917 collection was made on two species of *Crataegus crus-galli* and *C. mollis*. A great difference in the apparent attractiveness of the two trees was noted, although they stood side by side and their branches interlocked. The difference in collections is shown in Table IV.

TABLE IV.—COMPARISON OF 1917 COLLECTIONS ON C. CRUS-GALLI AND C. MOLLIS.

Species.	Number of Individuals. C. mollis.	 C. crus-galli.
rubiginosa	1,584	254
futilis	35	18
rugosa	19	6
hirticula	15	1
crenulata	2	0
vehemens	1	1
implicata	0	1
crassissima	0	1
	1,656	282

As can be seen from Table IV, slightly over six times as many *rubiginosa* were taken on *C. mollis*, nearly twice as many *futilis*, and three times as many *rugosa*.

A study of the proportion of sexes shows that large percentage differences occur only among the species in which few individuals are represented. Males of *Phyllophaga* are known to predominate at lights, and from the four important species concerned in this study it can be seen that they are also more numerous on hawthorn. The sex ratios and their totals for the four years are shown in Table V.

Table V.—Proportion of Sexes of all Individuals Collected on Hawthorn.

Species.	1917.			1918.			1919.			1920.			Totals.			
	♂	♀	To-tal.	♂	♀	To-tal.	♂	♀	To-tal.	♂	♀	To-tal.	♂	♀	To-tal.	% ♀ ♀
Rubiginosa	949	889	1,838	51	51	102	33	11	44	1,055	738	1,793	2,088	1,689	3,777	44
Futilis	21	32	53	2	7	9	13	8	21	68	28	96	109	75	179	41
Rugosa	14	11	25	3	1	4				12	11	23	29	23	52	44
Hirticula	9	7	16							21	9	30	30	16	46	34
Vehemens	2	0	2	1	0	1				2	1	3	5	1	6	15
Crenulata	2	0	2							1	0	1	3		3	0
Crassissima	1	0	1							1	1	2	2	1	3	33
Implicata	1	0	1								2	2	1	2	3	66
Bipartita										1		1	1		1	0
Corrosa										1		1	1		1	0
													2,264	1,807	4,071	

Summing up, it can be stated that hawthorn has one important *Phyllophaga* enemy in Kansas—*P. rubiginosa*—which does not occur in Illinois. Because of its absence, hawthorn is considered a relatively unimportant food plant of May beetles in Illinois, while in Kansas it constitutes 18 per cent. of the total food plant collections. Ten species of *Phyllophaga* were found to feed on trees of the genus *Crataegus* in Kansas, while nine occur in Illinois. An apparent choice is exercised by the May beetles among some species of the genus *Crataegus*, as was noted when two different species whose branches interlocked showed simultaneous collections of 1,656 and 282 beetles.

A NOTE ON THE MIGRATION OF CERTAIN WATER-STRIDERS (HEMIPTERA).[1]

By H. M. Parshley, Northampton, Mass.

Near the Biological Laboratory at Cold Spring Harbor, Long Island, N. Y., there is a small roadside pond of clear, cold water, fed abundantly by springs and commonly called "the dying pond," because from year to year its area is being gradually encroached upon by a growth of plants advancing from the west margin. While collecting here recently with a class I noted that every water-strider taken and apparently every adult on the pond was fully winged, a state of affairs which throws an interesting side-light on the general problem of pterygopolymorphism in the several families concerned.

A number of students, since Reuter published his early work, have given some consideration to the remarkable fact that in many species of Hemiptera alate and apterous adults (and often intermediate phases) occur simultaneously in identical environments, though in relative frequencies varying in the different species and possibly with certain seasonal or other external factors. It has been explained that the presence of wings might offer some handicap to active life on the surface film, so that natural selection could account for the persistence of apterous forms, once they were produced by mutation; moreover, there can be no doubt that the production of wings is expensive for the organism, so that the elimination by apterism of this drain on vitality provides an even more certain advantage for selection to lay hold on, if wings are in truth of no great value under ordinary conditions of existence. However, fresh-water environments are seldom permanently favorable, and thus most of the Gerrids and their relatives have found it necessary to retain the wing-producing factor in their germplasms, insuring the appearance of forms capable of flight frequently enough to accomplish the requisite migrations.

"The dying pond," situated far from other bodies of water, has thus been populated by winged migrants, and ordinarily we would expect to find their apterous descendants, at least in those species which produce the wingless phase most abundantly; but, as noted above, such was not the case in this instance and the explanation is to be sought in the presence of an artificial complication. The pond is occasionally oiled to kill mosquito larvae, with the result that other water insects, including the water-striders, are also exterminated. The oil still remaining about the margins indicated that this operation must have been performed not long before the occasion of our collecting trip—just enough time having elapsed to permit the restocking of the pond by winged migrants and their reproduction, as shown by the presence of young nymphs of *Gerris* and *Rheumatobates.* Unfortunately, it will be impossible to ascertain the pterygotic condition of these F_1 descendants, as an inspector stood by to give the pond a new covering of oil as soon as our collecting was finished.

---

[1] Contribution from the Department of Zoölogy, Smith College, No. 88.

The species which in an undoubtedly brief interval were able to repopulate the pond and which occurred only in the alate phase are as follows:

Family Gerridae: *Gerris remigis, G. marginatus, G. buenoi, Limnoporus rufoscutellatus, Rheumatobates rileyi.*
Family Veliidae: *Microvelia albonotata.*
Family Mesoveliidae: *Mesovelia mulsanti.*

Of the species enumerated some are very commonly or always winged—*e.g., L. rufoscutellatus*—but *G. remigis, R. rileyi, M. albonotata,* and (in less degree) *M. mulsanti* are rarely found in the alate phase. Of *R. rileyi,* indeed, which swarms in myriads on the surface of lakes less than a mile away, I have found in three years but a single winged specimen (a male) among thousands examined, and yet here, on "the dying pond," were half a dozen. It is worthy of note that the males and females of *R. rileyi* which were present, with their young, exhibited the mutilated hemielytra, which, as de la Torre-Bueno has shown, are broken by the insects themselves to facilitate copulation.

This occasion thus affords a striking illustration of the dispersive value to pterygopolymorphic species of alate individuals, confirming speculation by an actual instance; and it further demonstrates the sufficiency of the arrangement even in species, like *R. rileyi,* which produce winged individuals only with the greatest infrequency.

NOTES ON THE LIFE HISTORIES OF NORTH AMERICAN CATOCALAE, WITH DESCRIPTIONS OF TWO NEW FORMS.

By T. D. Mayfield, Newark, N. J.

(*Continued from p. 120.*)

Catocala herodias Strecker.

A very complete account of the ovum of this species was given by George J. Keller (1920, The Lepidopterist, III, p. 122), but as his description of the larva is very brief, the following notes as recorded by myself are herewith presented:

> *Larva.*—Stage I.—Head black. Body gray, with three purplish brown lateral lines and a rather interrupted subdorsal line which is well defined on thoracic segments; lateral brown patches on third and fourth abdominal segments; tubercles black, prominent, with long setae; ventral surface with the usual dark patches on first five abdominal segments. The young larva is typical of the oak feeders. Length, 5 mm.
>
> Stage II.—Head gray with sharply defined purplish brown longitudinal lines. Body gray; three purplish brown lateral lines and a similar subspiracular line, these lines are contiguous with the lines of head; deep purple brown sublateral patches on first five abdominal segments; tubercles black, those on posterior segments encircled with light gray at base, black setae; dorsal tubercles on tenth and eleventh segments rather prominent; a small black wart dorsally on fifth abdominal segment; dorsal area with a broken, pale brown line; patches on ventral area very distinct, brown black. Length, 10 mm.
>
> Stage III.—Head whitish marbled with brown, lines much as before; deeply notched at apices. Body purplish gray; two pale lateral lines and a similar spiracular line to which the brown lines of preceding stage form border lines; a pale geminate dorsal line enclosing indistinct diamond patches; the entire body is heavily sprinkled with brown, giving a marbled appearance; a prominent light brown wart on fifth abdominal segment; dorsal tubercles ochreous, conspicuous, other tubercles black; ventrally as before; sparse whitish lateral filaments present. Length, 19 mm.
>
> Stage IV.—Head much as before, but lighter at mouth parts, tipped with orange at apex of lobes; a thin brown lateral

line to lobes shaded frontally with lighter brown. Body greenish gray, heavily sprinkled with purple brown; lines of preceding stage present but less distinct; wart on fifth abdominal segment developed into a stout fleshy horn, smoky brown, with a decided crook to posterior of body; there is a sharp, well-defined white line, paralleled above by a dark brown line, at base of horn, anteriorally; tubercles ochreous, II of eighth abdominal segment prominent; ventral surface whitish with distinct brown black patches between prolegs; lateral filaments pinkish white, rather heavy. Length, 26 mm.

Stage V.—Head ochreous; deeply notched at the suture dividing the lobes, forming a prominent protuberance of a deep yellow color at apex of each; a dark brown border line to lobes shaded inwardly with paler brown; a short dark dash each side of clypeus, paralleled by a prominent white dash ascending toward apex of lobes; clypeus with a dark streak through center; the entire head is covered with brownish blotches and broken, longitudinal, whitish lines, giving a marbled appearance. Body greenish gray, heavily sprinkled with purple brown; two rather broken geminate lateral lines of pale gray with a purplish brown line along the upper edge and a similar subspiracular line which is scarcely distinguishable on thoracic segments; dorsal area with a pale geminate line enclosing irregular dark patches; subdorsal area darker than rest of body, giving the appearance of a dark stripe; dorsal horn on fifth abdominal segment rather extended laterally, dark smoky brown, crossed anteriorally at base by a white line, the dark brown line paralleling this line in the preceding stage having disappeared; tubercles ochreous, tubercle II of eighth abdominal segment prominent; ventral area whitish, tinted with pink, with distinct brown black patches on third, fourth, fifth and sixth abdominal segments; lateral filaments pinkish white, rather heavy. As the larva reaches maturity the entire body becomes quite greenish. This larva is closely related to that of *coccinata.* Length, full grown, 62 to 65 mm.

Food plant.—Various kinds of oak.

Catocala praeclara Grote and Robinson.

Ovum.—Elongate-circular; flattened greatly at both base and apex, causing equatorial region to appear as a slightly raised rim; micropylar area rather more extended than usual and consisting of small cells; about 50 slightly raised, granular ribs arise at base, ascending vertically, continuing just over rim; color dark brown. Greatest diameter, .9 mm., least diameter, .8 mm.

The ova are laid in single rows in the crevices of the bark and covered over with a sort of albuminous cement and show great similarity to that of *ultronia.*

Larva.—Stage I.—Head brown, large. Body dirty greenish with three lateral stripes of red brown; tubercles black. Length, 4.5 mm.

Stage II.—Head gray with longitudinal brown lines. Body gray with three broad lateral lines of dark brown which are most strongly pronounced on last three abdominal segments; dorsal area with a pale broken line; tubercles black with short setae; ventral area with the usual dark patches. Length, 8 mm.

Stage III.—Head whitish, heavily marked with blackish striations. Body gray, darkest along subspiracular area behind the prolegs; a pale geminate dorsal line enclosing diamond patches; a pale lateral line just below tubercle II, and two indistinct broken lines below this; dorsally a prominent dark brown wart on fifth abdominal segment; tubercles black; tubercle II of eighth abdominal segment prominent, followed by a dark oblique dash; ventral area whitish with a dark patch on each segment. Length, 16 mm.

Stage IV.—Head whitish, shaded with brown at apex of lobes; dark brown border line to lobes, which are slightly raised at apices, and centrally on each a dark brown crescent-shaped dash; suture dividing lobes deeply notched. Body purplish gray, sprinkled with brown dots; a light geminate dorsal line enclosing indistinct darker patches, this line is bordered with blackish brown lines at edges; pale lateral line below tubercle II and another rather indistinct pale line passing through tubercle III; dorsally on fifth abdominal segment is a very prominent, red brown, fleshy horn, curved backward, posterior to this horn is a broad transverse patch of rusty brown color extending down between the prolegs; tubercles orange, tubercle II of eighth abdominal segment prominent, dark brown at base, posterior to which is a dark brown crescent; prolegs light with brown lateral lines; ventral area whitish with a distinct brown black patch on each segment; sparse lateral filaments present. The larva at this stage strikingly resembles in maculation the full-grown larva of *grynea,* to which it is closely related. Length, 22 mm.

Stage V.—Head whitish, tipped with orange at apices of lobes and deeply notched as before; heavy black border line to lobes; a black line arising just below apex of clypeus, ascending half way to apex of lobe, thence excurved in a broad blotch; a black dash at side of clypeus, at mouth parts; apex of clypeus heavily striated with black. Body purplish gray, heavily sprinkled with brown dots; the pale lateral lines of preceding stage are only faintly indicated, as are also all other markings of previous stage more or less lost in the heavy sprinkling of brown dots; horn of fifth abdominal segment not as prominent as in preceding stage, concolorous with body; tubercle II prominent, anterior to horn ochreous ringed with black at base, posterior tubercles whitish; brown crescent posterior to tubercle II of eighth abdominal segment; ventral area whitish with brown patches; lateral filaments pinkish white, rather heavy. Length, full grown, 45 mm.

Food plant.—Thorn (*Crataegus crus-galli*).

A NEW FORM OF C. SORDIDA AND C. GRACILIS.

In breeding the larvae of both *gracilis* and *sordida* I was very successful in rearing a large number of specimens of both forms. The distinctive features of the maculation of the two, as well as the larval differences already noted, undoubtedly prove the validity of both species. I have before me a good series of each form and in none of the imagoes reared from the *sordida* larvae is there any indication of the basal dash on primaries, a distinctive feature by which this form may be readily distinguished from very similar forms of *gracilis*. Grote (1877, Can. Ent., IX, p. 169) in his description of *sordida* where he refers to the absence of the basal dash says: "This last seems the only important character"; in the specimens now before me there are other constant features separating the two forms; the dark lateral line on the patagium which is always present in *gracilis* is wanting in *sordida*, and the light, well-defined s. t. line of the former is rather indistinct and often broken in *sordida* specimens; the yellow of the secondaries of *sordida* is a duller color, often clouded with blackish; the median black band is usually broad, continuing in a clouded streak to base, there are occasional specimens in which this band is comparatively narrow, ending abruptly at anal angle; this feature is also found in *gracilis* specimens; the abdomen of *sordida* is a dull smoky gray compared with the yellowish abdomen of *gracilis*. Mr. Grote also says that it is "rather dark and somewhat hoary." This is not always the case, as the specimens before me show both dark and pale forms. There is also a form (mentioned by Grote) with the dark suffusion along inner margin of primaries; to distinguish this form from the very similar, typical form of *gracilis*, I propose for it the name **metalomus.**

This form appears to be comparatively rare, it has the same distinctive features by which it may be separated from *gracilis* as does the typical *sordida.*

Types: 1 male and 1 female bred from a Lakehurst, N. J., specimen; also a number of paratypes, male and female, taken at Lakehurst, N. J., from July 2 to 17, in the collection of the author. Paratypes in the collection of H. J. Erb.

C. gracilis form **cinerea** f. nov.

This is the form which has been confused by a number of authors with *praeclara* and is generally found in collections under this name; it may readily be distinguished from the latter by the absence of the metallic greenish sheen of the primaries; the transverse lines which are well defined in *praeclara* are in this form more or less broken, less dentate, and nowhere near as distinct, with the exception of the whitish s. t. line, which is always well pronounced in *gracilis* forms; the median black band of secondaries is regular in outline, following the internal margin of the outer band without the sharp inflection found in *praeclara;* on the under side the space between the bands is yellow, decidedly so on the lower portion of the secondaries, being somewhat clouded with black at base of primaries, and with the black bands of an even tone; whilst in *praeclara* this space is ochreous, with the median black band strongly contrasting, not reaching the inner margin, the marginal band is considerably lighter at outer margin.

The points of distinction between this and very similar forms of *sordida* have already been pointed out. It may be separated from *gracilis* by the entire absence of the dark suffusion along the inner margin.

This form occurs in both pale and dark forms, the paler form closely approaching *praeclara,* whilst the dark form is very similar to *sordida,* that selected for the type being the darker form.

Types: 2 males, 2 females; paratypes, males and females, bred from ova secured from Lakehurst, N. J., specimens; also a number of paratypes, male and female, taken at Lakehurst, N. J., from July 2 to 21, and a number bred from larvae collected at Dover, N. J.; in the collection of the author. Paratypes in the collections of J. B. and C. J. Paine and H. J. Erb.

GEOCORIS PALLENS STÅL. VAR. DECORATUS UHL., A PREDACEOUS ENEMY OF THE FALSE CHINCH BUG.

By F. B. Milliken[1] and F. M. Wadley, Scientific Assistants,
United States Bureau of Entomology.

This insect bears a family relationship to the one on which it preys, belonging to the same heteropterous family, Lygaeidae. It possesses the chinch-bug odor to such an extent as to be mistaken for the true chinch bug (*Blissus leucopterus* Say), on which account it is classed by some writers as a false chinch bug, together with *Nysius ericae* Schill., the species which furnishes such a large proportion of its victims.

DISTRIBUTION AND IMPORTANCE.

When the senior author began the study of *Nysius ericae* in 1913, he found these two insects closely associated, and attempted to rear both species. As the young of *Geocoris pallens* refused to feed on plants, perishing or unaccountably dwindling in numbers, and both adults and nymphs were found with swarms of *Nysius ericae,* the economic relationship of the two species became clear. Continued observations by the writers, both at Garden City and at Wichita, Kans., have confirmed earlier conclusions, and the study of *Geocoris pallens* as one of the important enemies of *Nysius ericae* was continued until the fall of 1917. The largest numbers of this predator have been found among swarms of this host species at both points in Kansas, and as the host is driven by the death of its food plants to change its breeding places at intervals through the summer, it is followed by its bloodthirsty enemy, large numbers of which soon congregate in each new location.

The occurrence of *Geocoris pallens* is by no means limited to the habitations of its relatives. Few, if any, insects that have come under the observation of the writers are more widely predaceous. At both Kansas points it occurs wherever low-growing vegetation provides food for aphids, jassids, membracids, ants, or small beetles and lepidopterous larvae, and is one of the most important checks observed to the hemipterous insects named, as well as to the young nymphs of other members of the order.

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[1] Resigned December 31, 1919.

DESCRIPTION.

ADULT.

Geocoris decoratus was described as a new species by Uhler in 1875.[2]

A copy of the description was kindly furnished by Mr. Edmund H. Gibson, U. S. National Museum, with the comment, "You will note that Uhler described it as a new species, but since then it has been placed as a variety of *pallens* Stål. by several authors."

THE EGG.

The egg is 0.7 mm. to 0.8 mm. long by about two fifths as thick, slightly curved on one side, nearly straight on the other. Both ends are rounded, the anterior being the more blunt and bearing 6 small tubercles set in a circle. It is pink or flesh-colored, with globules visible inside and the surface minutely and rather closely punctate.

THE FIRST STAGE NYMPH.

On hatching the nymph is about 0.75 mm. long by 0.30 mm. wide, and of a translucent yellowish or pale pink color, with reddish-brown eyes and a darker spot on the fourth and fifth segments of the abdomen. The antennae are dusky and the legs translucent. A few hairs or small spines are scattered over the body. The nymph rapidly becomes darker and by the end of half a day the second and third antennal segments and the tibiae and fibiae are opaque, the head much darker, and the thorax splotched with black.

LIFE HISTORY AND HABITS.

OVIPOSITION.

Adults confined in vials deposit eggs on the sides of the vials or on the cotton plugs. When confined on potted plants, they leave their eggs on the plants or on the sides of the containers.

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[2] Report upon the insects collected by P. R. Uhler during the explorations of 1875. *In* Bull. U. S. Geol. and Geogr. Survey, Vol. III, No. 2, 1877, pp. 410–411.

The eggs appear to be dropped at random wherever the female may be, and this habit probably prevails in the field.

EXTERNAL DEVELOPMENT AND HATCHING.

The egg slowly acquires a darker pink color. After about a third of the incubation period has elapsed, two reddish spots—the eyes—become visible near the tuberculated end. Thereafter little change occurs in the general color, but shortly before hatching an orange spot appears near the posterior end. An elongate indentation appears on one side of the egg several days before hatching and a small bulge forms near the tuberculated end.

The nymph escapes from the shell by splitting off a triangular flap, the point of which reaches the tuberculated area and the sides extend part way down the egg. This flap springs back into place, leaving the shell almost perfect in shape and condition. The pellicle, or membrane enclosing the embryonic nymph, remained attached to the point of the flap in the two instances on which careful observations were made.

Eggs in confinement hatched during May in from 13 to 17 days; others deposited during June in from 8 to 15 days. Temperature records for these periods are not available, but the difference in the incubation periods is due to corresponding differences in temperatures.

HABITS.

This species is very active. In attacking other insects that abound with it, it displays a ferocity out of proportion to its size, overcoming prey much larger than itself. It also shows cannibalistic propensities, even among other insects of suitable size, and this results in greatly lessening its numbers where other prey is absent.

The *Geocoris* approaches slow-moving insects until they are within reach of its beak, which is then quickly inserted. With insects smaller than itself, especially in the case of the leafhopper nymphs and others that are active, it seizes and holds them by means of its legs. After inserting its beak it lets go otherwise, and if its victim is not too large, lifts the latter from the ground, using its beak only. The larger insects tug frantically to escape, but soon relapse into helplessness from loss of body fluids.

In one case an ant was seen to attach itself to the leg of a *Geocoris*. The latter became frantic for a time, rushing about in an attempt to escape. After becoming nearly exhausted, it thrust its beak into the hapless ant, which soon relaxed except for the characteristic death grip of its jaws.

SEASONAL HISTORY.

By the last of May adults and several stages of young are present. Thenceforth, throughout the summer, they occur everywhere. Their activities during the colder portion of the year are indicated by the following entries from our field notes:

> October 27—Both adults and nymphs active. Temperature 28° and 26° F. on the 26th and 27th, respectively.
> November 17—Both young and adults active.
> December 9—Both young and adults active. Temperatures on December 6, 7, and 8, respectively, were 19, 18, and 20° F.
> December 12—Young active, adults mating. Temperature 40° F.
> December 22—Adults and large nymphs found.
> January 7—Nymphs and adults active; several pairs in copulo.
> February 21—One adult found.
> March 4—Several adults found.
> March 12—One adult and two first-stage nymphs found.
> April 11—Nymphs in different stages found.

This species maintains its activity at unusually low temperatures, resuming reproductive processes at 40° F., or even below; hence hibernation is probably not restricted to any particular stage, such individuals of any stage as secure proper conditions during severe weather surviving to perpetuate the species. The number of generations is not known, but probably several occur in a year.

THE AMARANTH FLEA-BEETLE.

By F. H. Chittenden, Bureau of Entomology, Washington, D. C.

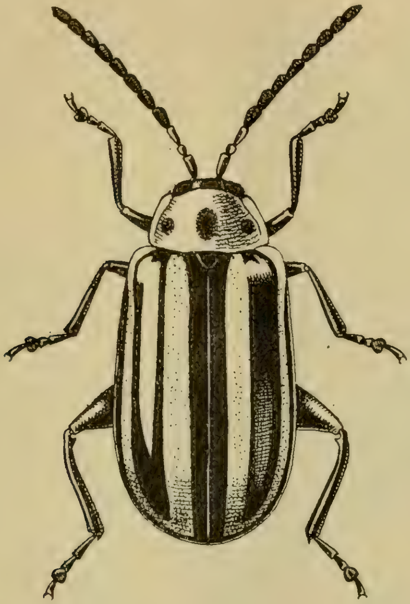

Fig. 1. The amaranth flea-beetle (*Disonycha glabrata*) about 13 times natural size. Original.

Injury by the halticine *Disonycha glabrata* Fab. to the leaves of ornamental amaranth, including *Amaranthus caudatus, tricolor, cruentatus, celosia,* and *plumosa,* has been observed by the writer on the grounds of the Department of Agriculture, Washington, D. C., nearly every year since September, 1907, when the beetles were seen during the last days of that month in numbers on the foliage. At that time the beetles were soft, showing that they had recently matured. In the earth about the roots a number of larvae were located, mostly about an inch below the surface. Leaves of many plants were badly "ragged" in the same manner that we see the wild amaranth attacked by this flea-beetle during the summer. Some beds were completely ruined.

During July and August the beetles are abundant about the District of Columbia, and their habit of feeding both in the larval and adult stages on species of *Amaranthus,* particularly *retroflexus,* is well known.

The writer has frequently noticed that when the beetles are frightened away from their food plant they quickly return, often to the individual plant upon which they were feeding. Individual beetles, when only slightly disturbed, fly up and circle directly back to the same plant.

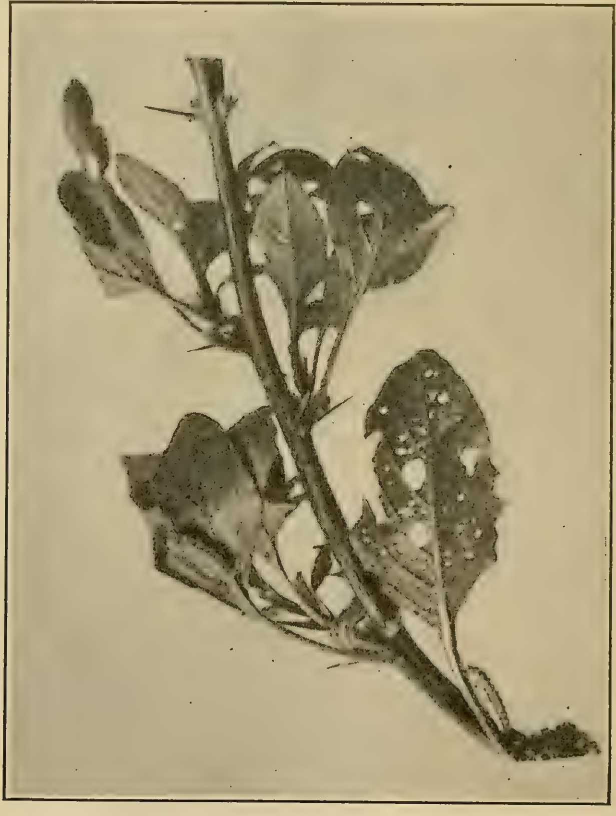

Fig. 2. Larvae of *Disonycha glabrata* on *Amaranthus spinosus.*

The habits and transformations of this insect were described by Professor Hy. Garman in 1891.[1]

The distribution accorded by Horn[2] reads, "occurs from Georgia to Arizona." It is common in New Jersey, Maryland, Virginia, and the District of Columbia, and ranges southward to Florida and westward through the Gulf region to Texas, as far south as Brownsville. It is also abundant in Kentucky and Indiana.

Agelena naevia Henz., a common species of spider, was observed with several individuals of this flea-beetle in its webs October 13.

Dolichopodidae (Dipt.) from the Source of the Hudson River, N. Y.—In the Proceedings of the U. S. National Museum, LXI, No. 25, 1922, p. 14, Mr. J. A. Aldrich describes *Dolichopus abruptus* from a male specimen taken at "Lake Tear, Essex County, New York. Collector unknown." It may be of interest to state that this insect was collected by me during the latter part of July, 1920, while a guest of Mr. Howard Notman in the Adirondacks. Lake Tear, situated at about 4,300 ft. altitude on the western slope of the notch between Mt. Marcy and Mt. Skylight, is regarded as the source of the Hudson River. Many interesting flies were obtained in that locality. Among the Dolichopodidae collected, in addition to the new species mentioned above, Mr. C. Van Duzee has kindly identified the following: *Dolichopus dorycerus* Loew, *D. stenhammari* Zetterstedt, *D. flavilacertus* Aldrich, Van Duzee and Greene, *D. discifer* Stannius, *D. harbecki* Aldrich, Van Duzee and Greene, *D. variabilis* Loew, *Hydrophorus chrysologus* Walker, and two apparently undescribed species of *Porphyrops*.—J. BEQUAERT.

David Sharp, F.R.S., formerly curator of the Museum of Zoölogy at the University of Cambridge and editor of the *Zoölogical Record,* died on August 27, at the age of eighty-one years.—*Science.*

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[1] Agric. Science, Vol. V, pp. 143–145.

[2] Trans. Amer. Ent. Soc., Vol. XVI, p. 207, 1889.

BOOK NOTES.

Applied Entomology, an Introductory Text-Book of Insects in Their Relations to Man, by H. T. Fernald (McGraw-Hill Book Company, New York).

This, as its title states, is an introductory text-book. Its aim is to reach two classes of students—those preparing for entomology as a profession, and that larger group who need the knowledge as a working tool in scientific agriculture. The first four chapters relate to insects as organized beings, their morphology, physiology, and embryology. The following five chapters discuss the necessity and methods of control of economic insects. The remaining twenty-four chapters contain the classification of insects and descriptions of those species of major economic importance. To judge from Chapter XXV on the Hemiptera, for a general and necessarily abridged text, the matter is well up with contemporaneous work, which is not always the case, even with monographs. The book is of convenient size, the binding is sturdy, the quality of the paper good, the printing excellent, and the illustrations show careful make-ready. While our own preference is for line drawings, which show structure much better than half-tones from photographs or wash drawings, the half-tones in this book are excellent, and adequate portraits of the insects and stages they illustrate. It seems scarcely necessary to say, except to those who may not have the privilege of knowing him, that the name of Prof. H. T. Fernald is sufficient guarantee of the reliability of the text. It is certainly a work to be highly recommended as an introduction to general entomology.

Report on the Scutelleroidea Collected by the Barbados-Antigua Expedition from the University of Iowa, by Dayton Stoner.

Report on the Orthoptera and Dermaptera Collected by the Barbados-Antigua Expedition of the University of Iowa, by A. N. Caudell.

These two annotated lists add measurably to our inadequate knowledge of the Antillean fauna. While Dr. Stoner in his article records only known species, he gives much ecological information secured at first hand, something which those who heretofore have received Antillean material with scanty data have been unable to do. Mr. Caudell found four new species in the material entrusted to his care, namely: *Eurycotis similis* Caudell, a roach; a short-horned grasshopper, *Amblytropidia stoneri* Caudell; and two crickets, *Cycloptilium minimum* Caudell and *Heterocous* (?) *dubius* Caudell. These Orthoptera afforded not only these new forms, but also noteworthy facts on geographical distribution and variation.

The Pentatomidae, on the other hand, were the usual range of forms coming from these tropical islands, whose faunal affinities seem to be with Central America rather than with the Southern Continent.

Scutelleroidea of the Douglas Lake Region, by Dayton Stoner. This is one of a series of studies on the Fauna of Michigan conducted under the auspices of the University of Michigan. The general plan of which this is a part is perhaps one of the most definitely laid-out entomological surveys in progress in the country, and, in consequence, it is showing results. The most interesting bug caught was the holarctic *Sciocoris microphthalmus,* but the comment and notes on distribution and habits increase our knowledge regarding the northern forms recorded. An excellent thought is the addition at the end of a "hypothetical list" which includes the species which, on recorded distribution, should be found there.

These three papers are included in *University of Iowa Studies in Natural History,* Vol. X, no. 1, first series no. 59, published by the University.

In general comment it may be said that the importance of faunistic and ecological work, never more important than now, is at last receiving the recognition it demands. The writer's predilection for this kind of research may warp his judgment, but it seems as though the theory of evolution or transformism will be put in final and strong form only in the field, and that its proper study in the field will furnish the necessary control to the closet study of specimens. Not alone that, but since change is a natural process, it must proceed by law, like all other natural processes. This law is probably the same in kind but different in action from the sum total of the forces that by growth and change produce the fully developed form from the union of two cells, whose mystery cytology has revealed in some degree.

Our enormous growth in population, with all the changes in the face of nature a vast population brings, makes these ecological field studies and distributional lists of great present importance, to enable us to gather, before it is too late, the data from which we may determine the origin of faunas and species, and their affinities and limits.

J. R. T.-B.

PROCEEDINGS OF THE SOCIETY.

Meeting of May 12, 1921.—Mr. Gerald B. Hill, Mitchell St., Townsville, N. Q., Australia, was elected a member of the Society.

Long Island Records.—Mr. C. Schaeffer exhibited a number of specimens of *Trogus vulpinus* Gravenhorst, the common parasite of *Papilio,* and also various color variations making transition to *T. fulvipes* Cresson; these several specimens were bred by Mr. Doll. Mr. Schaeffer now has an almost complete series ranging from typical *vulpinus* to *fulvipes* with black hind femora, thus showing that the latter is only an extreme variation of the former.

Scientific Programme.—Mr. Wm. T. Davis read a paper, "Entomological Observations in a Brooklyn City Lot." He also read a note on *Cicindela tascosaensis* (see Bulletin for December, 1921). He, furthermore, showed specimens of a new species of *Didymops* from Florida (see Bulletin for December, 1921), and also discussed *Epicordulia regina* de Selys (see Bulletin for October, 1922). Dr. J. Bequaert showed a collection of North American predatory wasps of the genus *Pepsis* and gave some information with regard to their habits and distribution.

Meeting of June 16, 1921.—The resignation of Mr. Howard L. Clark as a member of the Society was accepted.

Long Island Records.—Dr. J. Bequaert showed *Bombylius incanus* Johnson, which was taken in rather large numbers at Cold Spring Harbor, N. Y., on June 14. Also a specimen of *Microdon bombiformis* Townsend (*M. megalogaster* Snow) captured by Mr. Bell at Jericho, L. I., N. Y. Mr. Bell exhibited the following interesting Lepidoptera: *Mitoura damon* Cramer, of which five females were taken at Coram, L. I., May 15; *Amblyscirtes vialis* Edwards, from the same locality, May 15 and 22; and *Atrytonopsis hianna* Scudder, taken at Central Park, L. I., May 29. Mr. Doll spoke of his raising *Apatura clyton* Boisd. & LeC. on *Celtis.* He also exhibited *Notodonta georgica* Herr.-Sch. raised by him from a caterpillar found on Long Island. Mr. Schaeffer showed two species of *Donacia* collected by Mr. Engelhardt: *D. hirticollis* Kirby, from Yaphank, L. I., and *D. proxima episcopalis* Kirby, from Baldwin, L. I. He also presented some remarks upon a series of variations of *Crioceris 12-punctata* Linnaeus.

Scientific Programme.—Mr. Engelhardt read two short papers concerning "A New Aegeriid from Brooklyn, N. Y.," and on the "Foodplant of *Luperina passer.*"

Mr. Wm. T. Davis exhibited the remarkable bot-fly, *Cuterebra buccata* (Fabricius), a specimen of which was recently taken by him on Staten Island, N. Y.; also the rare beetle, *Cychrus elevatus* Fabricius, found by Mr. Bell at Coram, L. I.

MEETING OF OCTOBER 13, 1921.—A short paper by Mr. Bell entitled "Notes on Parasites of *Epargyreus tityrus* Fabr." was presented for publication (see BULLETIN for December, 1921).

Scientific Programme.—Account of the members' summer experiences and observations.—Mr. Engelhardt gives a brief account of a trip to the mountainous region of Wells, Vermont, where he captured, among other things, the rare hepialid, *Sthenopis auratus* Grote. He also exhibited *Perigea xanthioides* Guénée bred from a larva taken on ironweed (*Vernonia noveboracensis*) at Flushing, L. I., N. Y. During his trip to Washington, D. C., he found at Plummer's Island a species of *Papaipema,* later referred by Mr. Bird to *P. furcata* Smith; *Basilodes pepita* Guénée was bred for the first time from a larva found at the same place. Speaking of conditions at Yaphank, L. I., he announced that Mr. Hart had bought a tract of land extending about four miles along the river, which he wants to preserve in its natural state. He has given permission to the members of the Brooklyn Entomological Society to visit these woods, upon application to Mr. Engelhardt. Mr. Nicolay reported upon his collecting at Greenwood Lake, N. Y., on July 4, and also in the White Mountains with Mr. Mason. Mr. Schaeffer had collected *Donacia* at Yaphank and Wyandanch, L. I., and drew attention to species of this genus at present known from Long Island. Having lately had opportunity to study some type specimens in the Museum of Comparative Zoölogy, at Cambridge, he mentioned that *Gastroidea aenea* (Melsheimer) (*Gastrophusa aenea* Melsheimer), described from Pennsylvania, is nothing but the common *Nodonota puncticollis* (Say). Likewise *Cryptocephalus sanfordi* Blatchley is a synonym of *C. defectus* Leconte. Mr. H. Notman spoke of an extensive automobile trip during which he visited many remote parts of New York State: Tivoli, the Mohawk Valley at Fort Hunter, Sylvan Beach on Lake Oneida, and Lawville; altogether about 6,000 beetles were collected on this journey.

MEETING OF NOVEMBER 10, 1921.—Mr. George Frank was elected an Honorary Member in consideration of the services which he has rendered to the Society.

Long Island Records.—Mr. Doll exhibited a series of specimens of *Chrysophanes hypophlaeas* Boisd. taken at North Jamaica, L. I.; also *Libythea bachmani* Kirtland and *Limenitis ursula* var. *albofasciata* Newcomb, both from Richmond Hill, L. I.; and *Tolype laricis* Fitch taken at Central Park, L. I., the first record of this species for Long Island. Mr. Engelhardt showed *Cychrus elevatus* Fabricius found under a stump at Syosset, L. I., on Election Day. He also exhibited a number of cocoons, evidently of a species of *Tiphia,* sent to him by Dr. Gaiger; they were found during August, 1921, in great numbers in the drift on the beach along the coast of Maine; these cocoons are apparently of a parasite of some beetle larva.

Scientific Programme.—Mr. E. Shoemaker spoke on "Collecting Beetles near Washington, D. C.," illustrating his talk with some of the specimens obtained during his two trips to that region in July and September, 1921. He also presented some remarks upon his trip to Starlight, Pa., about the middle of June, 1921. Dr. J. Bequaert read some notes "On the Secretions of Certain Oak-Galls," reviewing what little has been published on the subject in Europe and North America. He also considered the various explanations proposed to account for these secretions. In the discussion which followed Mr. Wm. T. Davis called attention to the fact that the sponge-like galls of *Andricus seminator* Harris sometimes exude drops of a sweet liquid. Upon request from the chair, Mr. Frison made some entomological remarks from his field experiences.

MEETING OF DECEMBER 15, 1921.—Mr. Miles Stuart Pennington, of Quilmes, Argentina, was elected a member of the Society.

Scientific Programme.—Mr. Engelhardt spoke of some "Examples of Confusion in Aegeriidae." He showed that, in this family of moths, much confusion between the species has been caused by descriptions being made from one or a few captured specimens, often in poor condition. Another and perhaps more important source of error is the lack of information concerning foodplants and habits. He discussed in detail the status of several species to corroborate his statements. Mr. Davis exhibited a collection of "Ants of Long Island," including also the forms that have been found on Staten Island. He read some of his observations on these insects. Dr. J. Bequaert added some remarks concerning the local ant fauna (see BULLETIN for February, 1922).

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OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

NEW SERIES

Vol. XVIII 1923

Smithsonian Institution
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National Museum

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INDEX TO VOLUME XVIII.

(Arranged alphabetically throughout.)

Authors and Articles.

General Subject.

Another Reminiscence of Early Days, Wm. T. Bather, 56
Book Notes (J. R. T. B.), 35, 146
Editorial, 34
Memories of Fifty Years Ago, Charles W. Leng, 1
On Synopses and Keys (J. R. de la Torre-Bueno), 145
On the Abundance of Terrestrial Arthropods, Dayton Stoner, 162
Proceedings of the Society, J. Bequaert, 69, 172
Studies on the Blood of Insects, R. A. Muttkowski, 127
The Crumbs of Dives (J. R. de la Torre-Bueno), 170
Two New Comprehensive Works on the Hemiptera: A Review, H. M. Parshley, 166

Coleoptera

Altica or Haltica? W. C. Woods, 63
A New Longicorn Beetle from the Catskill Mountains, Wm. T. Davis, 97
Lepidocricus herricki Pierce, Charles Dury, 27
New Species of Coleoptera from California, Edwin C. VanDyke, 37
Records of Lepidoptera not in the N. J. Report of 1909, Newark Ent. Society, 136 (Coleoptera on p. 137)

Diptera

A New Genus of Phoridae, J. R. Malloch, 143
A New North American Species of the Genus Beckerina, J. R. Malloch, 32
A New Sugarcane Miner, J. M. Aldrich, 22
A Reclassification of the Subfamilies and Genera of North American Syrphidae (Appendix), R. C. Shannon, 17
Phasia (*Phorantha*) *occidentalis* Walker, an Internal Parasite of the False Chinch Bug, F. B. Milliken and F. M. Wadley, 28
Recent Publications on Tropical Entomoloyg, J. Bequaert, 99
Some Curious Dolichopodids in the Vicinity of New York City, J. Bequaert, 126
Synonymy in the Genus *Cetema,* J. M. Aldrich, 80

Tabanidae of Staten Island and Long Island, N. Y., J. Bequaert and Wm. T. Davis, 113

The Larval Stages of *Limnophora discreta* Stein, Werner Marchand, 58

The North American Species of the Chloropid Genus *Cetema,* J. R. Malloch, 33

The Range Overlapping of *Anopheles maculipennis* Meig. and *Anopheles quadrimaculatus* Say, Stanley B. Freeborn, 157

Heteroptera

A New North American *Notonecta,* J. R. de la Torre-Bueno and R. F. Hussey, 104

A New Species of *Labopidea* on Garlic, H. H. Knight, 31

A Saldid Genus New to the United States and a New Species, with Notes on Other Waterbugs from the Adirondacks, J. R. de la Torre-Bueno, 149

Distributional Notes on Hemiptera—I, Chris. E. Olsen, 163

Observations on the Ochteridae, R. Takahashi, 67

Orthocephalus mutabilis Fall., J. R. Stear, 62

Notes on the Eggs of Corixidae, H. B. Hungerford, 13

Phasia (*Phorantha*) *occidentalis* Walker, an Internal Parasite of the False Chinch Bug, F. B. Milliken and F. M. Wadley, 28

Taxonomic Characters in *Microvelia* Westwood, J. R. de la Torre-Bueno, 138

The Type Specimens of *Lygaeus kalmii* Stal subsp. *angustomarginatus* Parshley, H. M. Parshley, 23

Two New Species of Cantacaderaria, Carl J. Drake, 81

Homoptera

Distributional Notes on Hemiptera—I, Chris E. Olsen, 163

New Host for Membracidae, W. D. Funkhouser, 156

Hymenoptera

A Hymenopterous Parasite of *Epargyreus tityrus* Fabr., E. L. Bell, 33

Ants Accidentally Introduced into New York and New Jersey; and a Correction, J. Bequaert, 165

Late Swarming of the Ant *Lasius* (*Acanthomyops*) *claviger* Roger, Wm. T. Davis, 23

Neopasites and *Polyergus* at White Plains, N. Y., J. Bequaert, 171

New Species of Tenthredinidae from the East and Middle West, Alex. D. McGillivray, 53

Vestigial Pleometrosis in the North American *Polistes pallipes* Lepeletier, J. Bequaert, 73

Lepidoptera

A Correction, E. L. Bell, 93
A Hymenopterous Parasite of *Epargyreus tityrus* Fabr., E. L. Bell, 33
Amblyscirtes textor Hubner from Virginia, E. L. Bell, 12
A New Form of *Catocala gracilis* Edwards, T. D. Mayfield, 33
California Butterfly Notes—I, Karl R. Coolidge, 159
Collecting Florida Butterflies in March, E. L. Bell, 24
Collecting Notes on Lepidoptera, E. L. Bell, 21
Euphyes dion in New Jersey, E. L. Bell, 12
Notes on *Calpodes ethlius* Cramer, E. L. Bell, 154
Note on *Evergestis straminalis* Hubner, F. H. Chittenden, 84
Note on *Ogdoconta cinereola* Guen., F. H. Chittenden, 155
Polygonia progne on Long Island, E. L. Bell, 164
Records of Lepidoptera not in the New Jersey Report of 1909, Newark Entomological Society, 136
Synonymic Notes with the Description of a New Genus, Wm. Barnes and F. H. Benjamin, 123

Minor Orders

A Comparison of the Terminal Abdominal Structures of an Adult Alate Female of the Primitive Termite *Mastotermes darwinensis* with those of the Roach *Periplaneta americana*, G. C. Crampton, 85
Notes on *Trichothrips ulmi* (Fab.) in New Jersey, H. B. Weiss and Ralph B. Lott, 94

INDEX TO GENERA AND SPECIES OF INSECTS AND PLANTS.

New forms in **bold face**; synonyms in *Italics;* valid species in Roman; ** other animals; † Long Island records; * plants.

(For list of Florida butterflies, see pp. 24–27; for List of Tabanidae of Staten Island and Long Island, see pp. 113–122; for list of New Jersey Lepidoptera, see pp. 136–137; for selected genera in all orders, see Studies in the Blood of Insects, pp. 127–136. Forms mentioned in these lists not indexed herein.)

* Abies, 47
Abraeus, 64
Acanalonia bivittata, 164
Acanthia interstitialis, 149
  major, 149
  pallipes, 150
  reperta, 149, 150
  separata, 149
Acantholyda marginiventris, 53
  modesta, 53
Acanthomyops—see Lasius
Admetovis, 125
Agrilus addendus, 41
  sierrae, 40
Albuna fraxini gloriosa, 172
Alcathoe caudata,
  var. walkeri, 172
Altica, 63
Amblyscirtes alternata, 93
  vialis, 93
  textor, 12
Amblyteles duplicatus, 33
* Ambrosia trifida, 25
† Anchytarsus bicolor, 173
Anocomis, 49
** Anolis carolinensis, 25
Anomala orientalis, 70
Anopheles *annulimanus*, 158
  guttulatus, 158
  lewisi, 158
  maculipennis, 157, 158
  occidentalis, 157, 158
  quadrimaculatus, 157, 158
  selengensis, 157, 158
Aphiochaeta, 143
Aphodius haemorrhoidalis, 173
Apicomyia bella, 20
Apis, 78
Aploderus, 64
Arctophilla, 18
† Atrytonopsis hianna, 70

* Baccharis pilularis, 39, 40
Banasa euchlora, 163
Basilarchia albofasciata, 21
  astyanax, 21
Beckerina luteola, 32
  flaveola, 32
  orphnephiloides, 32
  umbrimargo, 32
  neotropica, 32
  similata, 32
Belonogaster, 77
† Biorhiza forticornis, 174
Blissus leucopterus, 29
Bombus, 77
Brychius, 42

Callicera, 17
Callosamia carolina, 175
Camponotus (Myrmothrix) abdominalis subsp. ustulatus, var. mediopallidus, 165, 174
Calpodes ethlius, 25, 154, 161

Cantacader chilinensis, 83
germaini, 81, 83
gounellei, 81
magnifica, 83
tingidoides, 81
Carabus memoralis, 70
Catocala gracilis, 33
abber. **lemmeri,** 33
Ceresa albescens, 164
bubalus, 156
diceros, 156
taurina, 156
Cerioides, 17
Cetema, 33, 80
hypocera, 33
procera, 33
subvittata, 33
Chabuata, 125
Chartolampra, 150
Chartoscirta (**Chartolampra**) cursitans, 149, 150, 154
* Chrysanthemum leucanthemum, 62
Chrysobothris **bacchari,** 38
lineatipennis, 40
mali, 39
texana, 39
Chrysomela, 63
Condidea, 18
Coryphista meadii, 69
Cucullia, 126
* Cupressus, 43, 49, 51
* sargenti, 43, 49
Cymatia americana, 13 et seqq.
Cuphocera ruficauda, 156
† Cuterebra horripilum, 173
Cynips strobilana, 174
* Daedalia quercina, 94

Danaus archippus, 25
Dascillus, 42
Dinoderus brevis, 46
nitidus, 46
ocellaris, 46
pubicollis, 45
Dityscus, 127
Dohrniphora, 143
Dolerus agcistus, 55
neoagcistus, 55
neostugnus, 55
nudus, 56
† Donacia tuberculata, 172

Ectecephala **tripunctata,** 22
Empira **columna,** 54
Engelhardtia, 125
ursina, 125
Enodia creola, 71
portlandia, 71
Epargyreus tityrus, 33
exadeus, 161
† Epimecis virginaria, form carbonaria, 21
Epiphloeus setulosus, 48
* Eriogonum giganteum, 160
Ernobius **caudatus,** 42
conicola, 43
cupressi, 43
mollis, 43
punctulatus, 43
socialis, 43
Eriopyga, 123, 125
Euhagena nebraskae, 173
Eumyiolepta, 19
auricaudata, 19
aurinota, 20
cornellia, 20
strigillata, 19
Euphyes dion, 12
Eupolia licentiosa, 123 et seqq.
Evergestis straminalis, 84

* Fomes aplanatus, 94
* lobatus, 94
Ferdinandea, 18
Feniseca tarquinius, 172

Gelastocoris, 18
Glossina, 100 et. seqq.
† Gnorimus maculatus, 173
Goniurus proteus, 161
Graphiphora, 123
Gypona, 164

Habraeus, 64
Haltica, 63 et seqq.
Haploderus, 64
Hedobia granosa, 42
  semivittata, 41
* Helianthus annuus, 155
  * tuberosus, 155
Heliconius charithonia, 24
Hemicallidium amethystinus, 49
Helodes, 64
Helosoma, 64
Hesperotingis antennata, 163
Heterarthron, 45
Homala, 64
Homalodes, 64
Homalium, 64
Homalisus, 64
Hormiscus, 64
Homophron, 64
Hylotrupes bajulus, 49, 50, 51
* Hypeis emoryi, 161
Hypera, 42

Iridomyrmex humilis, 165

* Juniperus, 51

Labopidea **allii**, 31
  sericata, 31
Lampracanthia, 153
  anthracina, 150
  coriacea, 149, 150
  crassicornis, 150
Lasius (Acanthomyops) claviger, 23, 173
Lathosea, 125, 126
* Lenzites betulina, 94
Lepidocricus herricki, 27
Lepidostola spp., 19
Liancalus genualis, 126
* Libdocerus decurrens, 51
Limnophora discreta, 58 et seqq.
Lygaeus kalmii,
  subsp. angustomarginatus, 23

Machilis, 89
Macrophya **bellula**, 55
  externa, 55
* Magnolia glauca, 175
* Malva borealis, 160
  * parviflora, 160
  * rotundifolia, 160
Mastotermes, 85 et seqq.
  darwiniensis, 93
† Megachile centuncularis, 69
Megathymus cofaqui, 25
† Melalopha albosigma, 173
Memythrus sepsiformis, 172
* Mesembryanthemum crystallinum, 159
Micracanthia humilis, 149, 154
Microdon bombiformis, 172
Microvelia, 68, 138 et seqq.
  americana, 149
  hinei, 172
  pulchella, 138
Milesia, 18
Miris dolabratus, 29
Mixogaster, 17
Muscina pascuorum, 174
† Myas foveatus, 70
Myiolepta, 19
  californica, 21
  lunulata, 21
  nigra, 21
  varipes, 21
Myrmothrix (see Camponotus)

Namangana, 123
Nausigaster, 17
Necydalis **acutipennis**, 51, 53
  barbarae, 52
  cavipennis, 53
  laevicollis, 52
  mellitus, 52
Neonympha phocion, 24, 25
Neopasites illinoiensis, 171
Notonecta **borealis**, 104
  insulata, 106, 149, 150
  irrorata, 105, 106
  lutea, 104

shooterii, 106
undulata, 106, 149, 150
variabilis, 149, 150
Nysius ericae, 28 et seqq.

Ochterus formosanus, 67
Ogdoconta cinereola, 155
Omala, 64
Omalisus, 64
Omalium, 64
Omalodes, 64
Omophron, 64
Ormiscus, 64
Orthocephalus mutabilis, 62
Oscinis, 33
† Oxycnemus nigripennis, 173

† Pamphila leonardus, 70
Papilio marcellus, form floridensis, 24
Paranthrene canescens, 173
Pareophora floridana, 55
guara, 54
† Pedinomma nearcticum, 172
Pelecocera, 17
Pericomsus ephippiatus, 172
Periplaneta americana, 93
Phasia (Phorantha) occidentalis, 28 et seqq.
Pheidole anastasii, 165
Philodes testaceus, 172
† Phyciodes nicteis, 70
Phyllobaenus **californicus**, 47
dislocatus, 47, 48
merkeli, 48
Phymatodes amoenus, 49
blandus, 49
* Picea, 47
Pienes panoquin, 24
Pieris *immaculata*, 159
metra, 159
novangliae, 159
rapae, 159
Pithanus maerkelii, 164
Plathypena scabra, 155
Podisus fretus,163
maculiventris, 163
serieventris, 163
Polia, 125
Polistes annularis, 76
fusca, 75
gallicus, 76
metrica, 73
pallipes, 73 et seqq., 173
variatus, 73
versicolor, 76
Polites brettus, 25
Polycaon **granulatus**, 43, 45
megalops, 44
punctatus, 45
stoutii, 44
Polyergus lucidus, 171
Polygonia progne, 164
* Polygonum lapathifolium, 161
* Polyporus betulinus, 94
* gilvus, 94
* hirsutus, 94
* pargamenus, 94
* versicolor, 94
Porocorixa, 14
Prenolepis fulva pubens, 165
Pristiphora bivittata, 56
* Prosopis glandulosa, 161
* Pseudotsuga, 47
Pyritis, 18

* Quercus alba, 174
* bicolor, 174
* kelloggii, 42

Rancora, 126
Rhamphocorixa acuminata, 13 et seqq.
Rhynchophoromyia, 143
trivittata, 143
Romalea marci, 70
microptera, 70
Rosalia, 42

Sandalus californicus, 37
cribricollis, 37
niger, 37

Saperda fayi, 97, 98
Saperda **shoemakeri,** 97
† Schistocerca alutacea var. rubiginosa, 69
  americana, 69
Sciocoris microphthalmus, 149
Scolia nobilitata, 173
Scotogramma, 125
Semanotus ampla, 50
  var. angusta, 51
  cupressi, 48, 50
  ligneus, 50
    var. ampla, 50
    var. parvicollis, 50
    var. sequoiae, 51
  litigiosus, 49
  nicolas, 49, 50
  rufipennis, 50, 51
  terminata, 50
  undatus, 49
* Sequoia sempervirens, 51
Sericomyia, 18
* Sphaeralcea ambigua, 161
Spilomyia, 19
* Sterium fasciatum, 94
Strymon avalona, 159, 160
  cecrops, 24
  melinus, 160
Sympiezocera japonica, 49, 51
  amethystinus, 50
  juniperi, 50
  laurasii, 51
Symatium ornithopium, 160
Synanthedon tepperi, 71
Tachytrechus, 172
  binodatus, 126
  laticrus, 126
  moechus, 126
  protervus, 126
  rotundipennis, 126
  vorax, 126
Taeniocampa, 123 et seqq.
Teleonemia, 83
Temnostoma, 19
Tetramorium guineense, 165
Thanasimus monticola, 47
  rubriventris, 47
  undatulus, 46, 47
    var. melanocephalus, 47
    var. nubilus, 47
  undulatus, 46
Thecla damon, 71
Thrips ulmi, 97
* Thuja, 51
Trachykele, 51
Trichoclea, 125
Trichopolia dentatella, 123
  obtusa, 123
  ptilodonta, 123
  ursina, 123
Trichothrips ulmi, 94
* Tsuga, 47

Velia pygmaea, 138
Vespa, 77
  diabolica, 172

Xyela **intrabilis,** 53
  salicis, 54

New Genera in this index, 3.
New Species, 28

Vol. XVIII FEBRUARY, 1923 No. 1

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

NEW SERIES

Smithsonian Institution
FEB 26 1923
National Museum

PUBLICATION COMMITTEE
J. R. de la TORRE-BUENO,
Editor
DR. J. BEQUAERT GEO. P. ENGELHARDT

Published by the Society

Price, 35 cents Subscription, $1.50 per year

Mailed February 24, 1923

Entered as second-class matter January 21, 1919, at the postoffice at Lancaster, Pa.,
under the Act of March 3, 1879

The Brooklyn Entomological Society

Meetings are held on the second Thursday after the first Tuesday of each month from October to June, inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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CONTENTS

MEMORIES OF FIFTY YEARS AGO, Leng 1
AMBLYSCIRTES TEXTOR FROM VIRGINIA, Bell 12
EUPHYES DION IN N. J., Bell 12
EGGS OF CORIXIDAE, Hungerford 13
SUBFAMILIES AND GENERA OF N. A. SYRPHIDAE, Shannon 17
COLLECTING NOTES ON LEPIDOPTERA, Bell 21
A NEW SUGAR CANE MINER, Aldrich 22
TYPE SPECIMENS OF LYGAEUS KALMII ANGUSTOMARGINATUS, Parshley 23
LATE SWARMING OF THE ANT LASIUS (ACANTHOMYOPS) CLAVIGER, Davis 23
COLLECTING FLORIDA BUTTERFLIES IN MARCH, Bell 24
LEPIDOCRICUS HERRICKI, Dury 27
PHASIA OCCIDENTALIS AN INTERNAL PARASITE OF THE FALSE CHINCH BUG, Milliken and Wadley 28
A NEW SPECIES OF LABOPIDEA ON GARLIC, Knight 31
A NEW N. AM. SPECIES OF BECKERINA, Malloch 32
A NEW FORM OF CATOCALA GRACILIS, Mayfield 33
A N. AM. SPECIES OF CETEMA, Malloch 33
A HYMENOPTEROUS PARASITE OF EPARGYREUS TITYRUS, Bell 33
EDITORIAL 34
BOOK NOTICE, FOLSOM'S ENTOMOLOGY, J. R. T. B 35
EXCHANGES 36

Bulletin of the Brooklyn Entomological Society

Published in
February, April, June, October and December of each year

Subscription price, domestic, $1.50 per year; foreign, $1.75 in advance; single copies 35 cents. Advertising rates on application. Short articles, notes and observations of interest to entomologists are solicited. Authors will receive 25 reprints free if ordered in advance of publication. Address subscriptions and all communications to

J. R. de la TORRE-BUENO, Editor,
11 North Broadway, White Plains, N. Y.

BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XVIII February, 1923 No. 1

MEMORIES OF FIFTY YEARS AGO.

By Charles W. Leng, Staten Island, N. Y.*

As well as I can remember, the prominent members of the Brooklyn Entomological Society in 1875 or 1876 when I, a boy of 16, joined it, were Graef, Tepper, Fuchs, Luetgens, and Schaupp. Of Graef and Tepper, I can tell nothing more than will be found in "Some Early Brooklyn Entomologists" by Edward L. Graef in Volume IX of the Bulletin. My own "Recollections of Charles Fuchs" was published in the same volume, and a brief obituary of August Luetgens in the Journal of the New York Entomological Society. Schaupp's position as secretary and editor made him perhaps of more importance than either of these; and as no notice of him has appeared, I shall begin with what I can remember.

Franz G. Schaupp was born in Ulm, in southern Germany, the date I do not know, but it must have been previous to 1840. He was a highly educated man, familiar with Latin and Greek, as well as French, German, and English, and with many sciences; he was employed in his younger days as a private tutor in well-to-do German families. Some cause, which I do not recollect, led to his being compelled to leave Germany and brought him to America via France, as doctor of the emigrant ship *William Frothingham*. Of his arrival in New York in 1866 I am fortunately able to give an account in his own words, from having preserved a letter he wrote to me in 1893; this letter will give you an idea of Schaupp's personality as well as an interesting picture of New York in 1866.

> As I had attended half a year the lecture on Anatomy and disected the arm and the leg of a man, I knew a *little* of

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* Address delivered at the half-century meeting of the Brooklyn Entomological Society, December 14, 1922.

anatomy, and during the half year I was staying with my friend C. Krell as secretary and assistant I knew also a bit of materia medica. But still I was rather afraid to pass an examination in spite of the assurance of some friends in Havre that it was but a matter of mere formality. There were three Doctores medicinae and their questions were as easy as possible, everybody could have answered them. As in 1866 some cases of morbus cholera were in Europe, Prof. Pettenghoefer of Munich, Bavaria, an authority in his branch, brought forward a new theory about the spread of this disease, which I had just read before leaving Kehl, and when one of the Doctors questioned me about cholera, I could speak intelligently of this new theory. Now the French Doctors had heard of it and read excerpts of Dr. Pettenghoefer's book, but were very glad, to have a full account and thus I, the examinandus, passed suddenly to the degree of *Lecturer*. Whereupon the gentlemen treated me as " dear colleague," most kindly and invited me to supper, which we took in a coffee-house, all the time talking morbus cholera.

One of the next days the good ship *William Frothingham* from N. Y, Master Qualey set sail,—good bye, old dame Europe! All went well for about ten days, but then a storm came and I became awful sick and so did about 100 of the passengers. I could not help myself, but did really cure a dozen people, giving them the same remedies I took myself. We stayed at sea seven weeks, I had a fine time, plenty chicken, canned beef and veal, having my meals with the captain and first mate and a whole cabin for myself. I caught some fish, as we were some days near the Newfoundland Banks without wind. As to my professional practice as surgeon I had no serious case, the common complaint was seasickness, and indigestion, the emigrants having nothing to do, took frequent repasts devouring the bread, ham, cheese, saussage, etc. they brought from home, to pass the time and having no exercise, the bowels did not work and so they came for the Doctor who gave them either castor-oil or epsom salt. One young lady slipped on the wet deck and was hurt, so that she could not walk, but for a few hours refused to show the hurt parts, a stout young German had the stomach and bowels so full, that he complained of a heavy swelling in the stomach and refused to take castor oil or salt; for him I dissolved a good handful of salt, seasoned it with raspberry-juice and after an hour the swelling passed a posteriori. To some who complained of toothache I had to pull teeth, Capt Qualey wanted me to shave him, but I told him I never did, so he was satisfied with one "operation" and for the remainder of the journey the ship-carpenter officiated as barber.

When we left Havre, I had three cases of wine and three of diff. kinds of brandies and bitters, which I most liberally distributed among poor, sick passengers; but as the journey lasted so very long, I told the second mate, that I was sorry I had no more wine left, he replied I might have as much wine as I wanted and indeed, he brought me as much, so that every sick person got a bottle or two, all gratis. How was this? We had a cargo of claret on board, the mate opened one and on arriving at New York, he took a hatchet and broke a stave of the half empty barrel!!

One Friday night the captain called me on deck and showed me a light—America in sight! A light just as was the case with Columbus! All came on deck and waited for day-break, to see their new home! Hope and fear may have battled in many heart, but the principal feeling was that of satisfaction to have ended that long journey. When morning came we were quite far from that sandy shore of Long Island, we had a pilot, who brought news-papers, the first news after seven weeks! Austria had been defeated during this short time by Prussia; I translated the news into French and German for the emigrants (¾ German ¼ French), the Boarding officer, Health officer and Customhouse people boarded the vessel, I treated the whole crowd with cognac, and the customhouse officers most politely chalked my whole packages including the empty wine and brandy-cases with their hieroglyphs without looking in.—

As emigrants are not landed on Sunday, the boarding officer, a German, asked me if I should like to go with him ashore. If I liked after seven weeks at sea! The Captain gave me leave of absence till 12 oclock midnight! and thus I landed with Uncle Sam's little steamer at Pier No 3 North River Saturday at 5 pm in August 1866. The Health officer, the Boarding and two Custom-house officers came along with me and we entered a saloon, each had a glass of wine or liquor, and when I wanted to pay my part, I was told, All is paid, that same thing happened four times—what a glorious country! Drink as much and what you want—all paid! My country-man, the boarding officer explained the matter to me, and said: One asks: Gentleman have a drink with me, he orders and pays for all. Well, of course, I said: Gentleman, have a drink with me, and put a gold dollar on the bar, we drank and the bar keeper handed me a dollar back. Now, how is that?

Well in 1866 gold was worth $1.50 and as I had about $300 in gold, I had in fact $450.00. After passing into a few saloons, the Boarding Officer asked me, where I intended to take lodgings and when I told him, I did not yet know, he accompanied me to the Stuttgarter Hof, kept by a countryman of mine, where he introduced me to the proprietor as the Doctor of the *Wm. Frothingham*. What kind people! I was at once introduced to the lady of the house and two pretty nieces, invited to a splendid supper, after that I had a ride in the hotelier's carriage uptown, we went in several fine saloons, my host threw a dollar on the counter and ordered some Rhine-wine, fine cigars, went into a theatre (Bowery), stayed there but one act, drove home at about 10 o'clock and I had not to pay a cent! What a glorious country, these United States, gold rolling, kindness, liberality and hospitality boundless. During the social chat my landlord asked, if I could induce some of the emigrants to stay at his hotel, the fare was $1.50 as everywhere and the meals the same he had on his table. You see that was business! I promised him to bring at least one hundred and so I did. As I had to return at midnight on board ship, he gave me two boxes of cigars, a dozen bottles of beer, some bottles of milk for babies, some fruit, German and French Newspapers of the last weeks, went with me to the Pier, paid the sailor $1.00, who had to row me in a small boat on board of the ship which was at anchor in the middle of the North River. When the emigrants were landed, over one hundred went with me to the "Stuttgarter Hof," where all were kindly treated, well fed, and to most procured situations. I intended to stay a month in N. Y. and then return with my free ticket, 2d cabin of a French steamer; but I liked it so much, and lived so careless, that I sold my ticket and resolved to remain here. In the first time I made many excursions, mostly with the hotel keeper and at his expenses, then I served as interpreter and guide to some of my passengers, who were seeking situations and trying to hunt up some friends residing in N. Y. and neighborhood. One of those trips was quite interesting. Two young ladies, one engaged to a young man, had an aunt living in No. 69 or so South 1th Wmsbrgh, c/o somebody. I went with them one Sunday morning, came to Grand street Wmbrgh, but could find no such No., then we tried North 1th Street, all in vain, during several hours. Then I told them I had an old lady-friend, living in Myrtle Ave. near Broadway (an old sweetheart of my younger days), married to a grocer, named Pfeifer; we found Broadway and Myrtle Ave., but no such a grocer. At the corner of Brdwy and Myrtle Ave. was a great park, kept by one Aignue, there we entered and asked if we could get some dinner, the people were German and very kind, and when I told them our business, they said, O that's Mr. Pfeifer corner Flushing Ave. and Delmonico Place, their boy showed me the place and my old sweet heart recognized me at once, fell into my arms and wept for joy! I had been the first and only person of the old home she met. Her husband, an elderly gentleman went with me to get my three companions and then we went to a garden, had some beer and the owner of the garden happened to be from the same town in Germany as my companions. We spoke of our fruitless search of the aunt, when an old lady crossed the beergarden and I said to the girls in jest, "Look that is your aunt." The girls were hardly 20 years old and their aunt had been in America for 25 years, so they did not know each other. Mrs. Pfeifer called the old lady and said: Look here are some people from our country, Mr. Pfeifer invited her to take a drink with us and when she questioned the girls, it was in fact their aunt. All at the table felt some moisture in the eye at the touching scene. The girls stayed with her aunt, who was well to do and both married afterwards and I stayed after some time in board with Mr. Pfeifer, paying $1.00 a week for board!

In the hotel I had nothing to pay, for it was customary, that a hotel keeper pays $1.00 for each emigrant to the one who brings them. I did not accept any money, as I thought it would be wrong, but did not refuse free board and many treats.

One day I was at a restaurant and an American approached me asking if he could look at my clothes?! I did not know what he meant, first, I had a cheap, shoddy, suit from Paris and finally the gentleman said, if I would give him my suit, I might pick out any one in a fine Broadway clothing store. This I did and changed the Paris suit, for which I paid 20 francs = $4.00 for a fine American suit priced at $30.00.

So far all went smoothly, but the future was sometimes badly clouded.—Sunshine and thunderstorms interchanged.—

I wish that Schaupp had continued his reminiscences, but they ended abruptly with this letter for reasons suggested, rather than stated, in a subsequent letter.

Dear Friend Leng:

It is, indeed, a very long time, since I have written my last letter to you and the reason for my long silence is or was my indisposition to write my curriculum vitae! I procrastinated

> from day to day, but I never feeled inclined to go to work it out.
>
> When I go over my past life, a sad, very sad feeling is awakened, when I consider the many good chances I was offered and which I had neglected & slighted, I feel deep regrets. I might be by this time a gentleman of good standing, in easy circumstances, a much more useful member of the human society, perhaps a man of fame. I had learning enough, sufficient common sense, pretty high aspirations, but alas! too much carelessness and indolence.
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> If I were young and had to live my life over again, I should "*perhaps*" be wiser, but, now, I am too old and the loss is irreparable.
>
> But still I am happy, I forget what has been.

As far as I know, the ten years between 1866, when he came to New York, and 1876, when I knew him, were occupied with teaching languages partly at Wright's Business College, partly at private houses or in his own room, and with collecting and studying beetles, in which study he had by 1876 gone far, having a large collection and being in constant communication with Horn and Leconte, visiting the latter especially often in Philadelphia. Schaupp's appearance during these years has been well described by Mr. Graef: "Of middle age, of very large proportions, weighing perhaps 250 pounds, with a massive head crowned with curly hair well tinged with gray . . . he was pleasant, cordial and overflowing with good nature and humor." It might be added that his skin was olive-brown and his eyes small and twinkling, and that one peculiarity was the frequent use of the word "atchidentity" to express any strong emotion, as when a beetle dropped on the floor. For the sake of continuity I must leave Schaupp for a few minutes and interpolate the beginnings of my own connection with the Society. I began to collect insects fifty years ago, in 1872, the year in which the Society was organized. In September of that year, when the pupils of the Lafayette Institute assembled after the summer vacation, one of them, Hugh Hill, about thirteen years of age, told how he had spent the summer in England with relatives and had promised to collect some American butterflies for one of them. I, as his chum, was naturally obliged to assist him, and our first attempts were among the thistles and other fall flowers that grew in Brooklyn's vacant lots around Bedford and Nostrand Avenue. We soon concluded to make collections for ourselves as well as for the English uncle; and when, six months later, the school broke up and we were sent to the Polytechnic Institute, we considered ourselves, though only fourteen, entomologists and proud of our acquaintance with John Akhurst, from whom we were buying pins and cork and wishing we could buy some of the gorgeous butterflies he would show us when good-humored. I still use the pinning forceps I bought from Akhurst and remember his protruding blue eyes and straggling white beard as if only a few minutes instead of fifty years had passed. At the Polytechnic we tried to interest other boys and some occasionally went tramping with us, sometimes leading us to woodland spots they knew of between Greenwood Cemetery and Fort Hamilton, others near Canarsie, out toward Woodhaven and Jamaica, or beyond the Myrtle Avenue car barns; but as none of them persisted it is useless to mention their names. Gradually we found that a few boxes of insects were housed in Professor Plympton's room, and that a collection could be seen at the Long Island Historical Society on Court Street. Finally we organized the Polytechnic Entomological Society and secured the attendance at a meeting of some older men of whom we had heard. Akhurst, W. V. Andrews, and P. Elbert Nostrand were, I think, among the first. Andrews was a retired British Army officer, glad to eke out his slender income by selling Edwards's "Butterflies of America" for a commission or even specimens from his duplicates. From him I made my first purchase of a pair of *Hoplia coerulea,* going without lunch for the purpose. Nostrand had been a Polytechnic student, but by 1875 was graduated and working as a city surveyor in the Bushwick district. His home was surrounded by a large garden and many pear trees, the fruit of which Mr. Andrews greatly enjoyed when we met at Nostrand's house. Nostrand soon nominated George D. Hulst as a member; at his suggestion our name was changed to Long Island Entomological Society.

With Hulst and Nostrand I had many walks afield, became initiated in the joy of sugaring, and made my first acquaintance with a skunk; but I had already begun to collect other orders, especially beetles, and could not sympathize entirely with their exclusive devotion to Lepidoptera. I think my first beetle was a *Platynus cupripennis,* and that, being afraid it might sting, I tried to stab it with a pin as it ran away. I was young when I commenced to collect, but others have begun even younger. The Twelfth Report New York State Entomologist, for instance, contains, on page 299, a figure of *Neuronia pardalis* captured in June, 1896, by Howard

Notman, who by the date of his birth, elsewhere given, could have been only 15 when he began catching rare insects and making colored figures of them.

During these early years my parents, of course, took an interest in my entomological pursuits and discussed them with their acquaintance. One of these happened to be a niece of Dr. George H. Horn, to whom I consequently wrote asking advice and assistance. My letter probably showed my youth, and, if I remember correctly, Dr. Horn's reply suggested my growing a little more and meanwhile visiting Schaupp. It may also have happened that I heard of Schaupp from Akhurst or Hulst. I think I wrote to him, inviting him to visit the Long Island Entomological Society, and, however it came about, there was a meeting in my father's home, 275 Clermont Avenue, about 1875, at which Schaupp presented a plan for amalgamating the Long Island and the Brooklyn societies. His proposal was not acceptable to the majority, but, after a time, several of the members joined the Brooklyn Society individually. I believe I was the first of them to do so, becoming a member in 1876 or 1877, and certainly before the first volume of the BULLETIN was printed in 1878. By that time I was out of school, taking weekly lessons in German from Schaupp, and carrying to him the collections made on the previous Sunday to get the new ones named. So it naturally happened that I was called upon to correct the too evidently Teutonic idioms that sometimes appeared in the galley proof and, as I was then working for a mechanical draughtsman, to draw the seal which I am proud to see still, after 44 years, appears on its cover. The figure of *Cicindela schauppi* in the center was drawn by Schaupp himself or by some artistic friend of his, the remainder was my work.

Some account of those entomological meetings of nearly fifty years ago may be interesting. They were held in Schaupp's room, which was on the top floor of Schaeffer's saloon at No. 9 Broadway, Williamsburg, the Schaeffer family occupying the rest of the floor. There was a long table in the room and I usually arrived early enough to help Schaupp to clear it of accumulated boxes and books. One by one the members climbed three or four flights of stairs to be heartily greeted by Schaupp. The knock on the door was answered by "herein," the final departure was always "es hat mir sehr erfreut," such greetings, of course, in German. There was Graef, well-dressed and argumentative; there was Schmelter, interested in Chrysomelidae, and Tepper, absorbed in *Papilios,* both tall, thin, and retiring in their modest behavior; there was Fuchs, engraver of gold jewelry, then wearing a great brown beard and possessing a glorious thirst; there was Hoyt, a bookkeeper in McLoughlin's toy-book factory; and finally Gustav Fuchs, who had no collection, but belonged for sociability's sake. These were almost always present; sometimes there came also Salzwedel, Gissler, specializing in Tenebrionidae, and Merkel, who had a famous collection of Cychrini. Specialization was Schaupp's pet theory and we all fell more or less earnestly in line except Luetgens, who maintained throughout his seventy years of life a steadfastness in his own way of doing things that not even Schaupp could change. To proceed with the account of the meetings, there would be much miscellaneous conversation among the members, in German, except as Hoyt and I might be planning a Sunday tramp, until Schaupp demanded order and instructed Gustav to read the minutes of the preceding stated meeting. These were in English, read with a strong German accent, and were freely corrected by all present. They were followed by Schaupp's reading such letters as had been received, often including personal matters, offers to sell specimens, biological and taxonomic notes from Horn, Dury, Blanchard, Belfrage, etc. Each letter was freely discussed and at length except that Fuchs would occasionally protest against the length and aridity of the meeting. Schaupp's letters disposed of, there was rarely any delay in adjourning to Schaeffer's saloon downstairs, where, with the help of beer, coffee, cakes, and sandwiches, the informal meeting was prolonged to a late hour. I had to watch the clock for a Roosevelt Street ferryboat that would enable me, by running to Whitehall Street, to catch the last boat for Staten Island, and then walk four and a half miles to my home. On rare occasions the informal meeting was delayed for Gissler to speak on the anatomy of Tenebrionidae, or Meyer to speak on *Papilio*. I usually had with me a box half full of captures, partly to get names, partly in hopes that Schaupp would fill the other half from his duplicates. Sometimes my specimens would start discussion. *Melitaea phaeton,* which I had found abundant in a swamp near Canarsie, did so once; *Thaneroclerus sanguineus* on another occasion. During the years I remember best there was little field work by the older members, except in summer vacation time, which Schaupp, for instance, often spent at Callicoon, N. Y. There was one general field meeting at Clifton, N. J. There was little interest in any orders except Lepidoptera and Coleoptera; indeed, I do not recall their being even mentioned. After May, 1878, the Bulletin was of prime interest, being practically edited at the meetings. Its first volume is especially a reflection of the matters presented at the meetings, Schaupp's beetle larvae, Graef and Tepper's rare butterflies, letters from Dury, Fernald, Horn, Leconte, etc., while the advertisements show from whom the members bought their material and supplies. The meetings were full of life and fun. To proceed to a little later in the history of the Society, before the end of 1878, Hulst and Nostrand had joined the Society and in deference to them the meetings were conducted more in English. The succeeding volumes of the Bulletin show the increasing influence of Hulst in the preponderance of papers on Lepidoptera and he soon became a member of the publication committee. Another important addition to the Society came in the person of John B. Smith. It was at one of the meetings in Schaupp's room that he proposed a new member whose artistic ability would permit of the Bulletin being more freely illustrated. Name? "Smith"; what Smith? "John," the replies being greeted with laughter. Then began the immense series of John B. Smith's contributions to Entomology, tabulated after his death by Grossbeck, 546 titles in 31 years, including three editions of the "Insects of New Jersey," which has been in such constant use. By 1882, though only 24 years old, Smith had become assistant editor, and continued as such until he became editor-in-chief in 1884. The present president of the Society, William T. Davis, was also an occasional visitor to the famous room at No. 9 Broadway. When I returned to Staten Island in 1879, I looked in Cassino's Directory for Staten Island naturalists and found the name of N. L. Britton. I wrote to him and was referred to Mr. Davis. He promptly came to see me and thus began a friendship that has continued for over forty years. We attended the Brooklyn meetings together as often as possible, but had many more meetings in the Staten Island woods at a time when Cychrini, orchids, and wild fruits were more common than now.

The years from 1878 to 1884 were years of great activity in the Society and the results of lasting benefit to entomology. The synoptic tables of Carabidae, prepared by Schaupp with the assistance of Dr. Leconte and Dr. Horn, make the volumes of the Bulletin then published still the principal source of information on that family. The other contents of those early volumes were sufficiently varied to be of interest to subscribers and members.

The Society outgrew its quarters and the place of meeting was changed to Wright's Business College. Without disparagement to later editors, the stimulus behind the BULLETIN and the Society was Schaupp, and his departure from Brooklyn in 1884 was a misfortune for the Society as well as for him. The last twenty years of his life were spent in Texas and, for part of the time, in poverty. He maintained himself partly by giving lessons in English to the children of German ranchmen, partly by collecting insects, at one time for Riley, but mostly for private collectors. His genial disposition won friends for him in Texas as it had done in Brooklyn, and when his death happened on November 7, 1904, the local newspapers, as Dr. Schwarz has told me, recorded the departure of a learned and honored citizen with regret.

There was one other member of the old Brooklyn Entomological Society with whom I became well acquainted and of whom no biographical notice has appeared. Christopher H. Roberts should certainly be remembered at this time. In the *American Entomologist* for December, 1868, page 80, among the answers to correspondents, is one to C. H. Roberts, of Poughkeepsie, anent apple-twig borer (*Bostrichus bicaudatus*). In Volume VI of the BULLETIN, page 77, you find the same name signed in 1884 to collecting notes, and thereafter for many years Mr. Roberts was a prominent member of the Society, 31 years its treasurer, and the author of valuable papers on water beetles, which were his specialty. I came to know him through John B. Smith, with whom, I think, he took the degree of D.Sc., and beginning in 1884, he was a frequent visitor at my home on Staten Island, often arriving on Sunday morning for breakfast, tramping and collecting all day, and returning in the evening for supper. Sometimes Julich, or Soltau, or Linell, would join in these tramps; if Soltau was along, the Constanz Brewery would surely be included in the route. Later Roberts would come to Staten Island in the evening to study Chrysomelidae and smoke cigarettes, of which quite a stock of butts would accumulate before bed time. Still later his removal to Sound Beach made our meetings less frequent, so that I knew little of his last years which ended on September 29, 1916.

I could go on indefinitely with these memories of friends of many years ago, George Horn, Merkel, Julich, Reinecke, Bolter, Schuster, Linell, and many more whose names come back to me, but I find I am getting down to comparatively recent times of only twenty or thirty, instead of fifty, years ago. So the last thing I will speak of is the incorporation of the Society in 1885 and the list of members thereto attached. Of the six who signed the certificate of incorporation, Graef, Hulst, Neumogen, Smith, and Roberts are gone. I and "the humble notary," as Mr. Archibald C. Weeks once called himself, are the survivors of the legal transaction. Of the members at that time, George Angell, Beutenmuller, Doll, Franck, Gade, and Pearsall are also happily still living. More than the survival of any individual, however, what counts is the survival of the Society itself, which after fifty years is still vigorous and useful in promoting Entomology. Under the able management of Franck, Dow, Engelhardt, Bueno, Schaeffer, and Bequaert, and most of all, our beloved president, William T. Davis, the second of American entomological societies flourishes again as it did in Schaupp's time. I congratulate the efficient officers who have accomplished this result and close with a wish that I know all will echo, that the Society may be still stronger after another fifty years in passing have again changed the youngest member into the oldest.

Amblyscirtes textor Hübner from Virginia.—A single male specimen of this species in fresh condition was received by me from one of my correspondents, who collected it in the Dismal Swamp in Virginia on May 30, 1922. Records of this species from Virginia are scarce, if any at all, North Carolina being generally considered the northern limit.—E. L. Bell, Flushing, N. Y.

Euphyes dion in New Jersey.—Two male specimens of *Euphyes dion* Edwards were taken at Stockholm, Sussex County, New Jersey, on July 8, 1922. Most of the records of this species in New Jersey are from localities farther south and nearer the coast.—E. L. Bell, Flushing, N. Y.

NOTES ON THE EGGS OF CORIXIDAE.

By H. B. Hungerford, Professor of Entomology, Kansas University, Lawrence, Kansas.

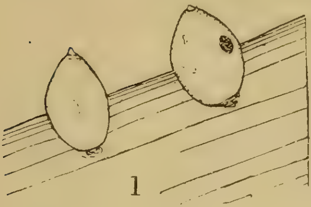
There is today, as there always has been, an active interest in the water and the life it supports. To those of us who conduct classes to the lake, pond, or stream for a survey of aquatic life, any contribution that helps to recognize the objects of our catch is indeed welcome.

This little paper is a report upon the various types of the eggs of the Corixidae as we know them in our North American waters. The nymphs resemble the adults sufficiently to be recognized by any one who is in the least familiar with the structure of the Boatmen. The inverted top-shaped eggs also are familiar objects to those accustomed to collecting in our fresh waters (Fig. 1). Sometimes they are found thickly covering every available support the water affords. Their astonishing numbers in the water is more nearly appreciated when we recall that they have been gathered by the Mexicans from reeds submerged for the purpose and utilized by them as food. This may be a food source not to the liking of our cultivated palates, but it is a convincing illustration of abundance. There are, on the other hand, a couple of corixids, the eggs of which are not so generally known. The first is *Ramphocorixa acuminata* (Uhler), the interesting oviposition habits of which have been reported hitherto, and the second is *Cymatia americana* Hussey, a recently described insect, whose egg is here reported for the first time.

Ramphocorixa acuminata (Uhl.) generally, but not exclusively, attaches its eggs to the body of a crayfish (see Plate I, Fig. 6). Dr. S. A. Forbes (1876) appears to be the first one to have found them, but Dr. J. F. Abbott (1912) was the first to fix the identity of the species possessing this curious habit. This latter author calls it a symbiotic relationship. There seems to be some justification in believing that the insect derives some benefit. When one gathers egg-bearing crayfish it is quite noticeable that the eggs occur upon the first and second abdominal pleurites more frequently than elsewhere. Especially is this to be seen when only a few eggs have been attached. The apparent explanation of this would be that there is a constant stream of water being drawn over these parts as the crustacean draws the water beneath the carapace. (See Fig. 6 and Fig. 7.)

Cymatia americana Hussey was described in this Bulletin, Vol. XV, p. 80, from a pond near St. Paul, Minn. It was the first member of the genus Cymatia to be found in this country and has proved to be a most interesting form. Mr. Hussey gives an account of its remarkable mode of hibernation in Vol. XVI, pp. 131–136, of this Bulletin. It may be recalled that he found the bugs to pass the winter sealed in small cavities in the ice, from 10 to 50 individuals tightly crowded in groups in each pocket. I had the pleasure of visiting the pond from which this species was taken many times during the summer of 1921. I found it fairly abundant, but not the dominant species of the pond as it had been a few seasons before. By early August it was not to be found in any part of the pond, although diligent search was made for it several times. The unprecedented hot summer appeared to have warmed the waters too much for its existence. Collections were made in a various number of water bodies with which the region abounds, but *Cymatia americana* was not taken. This species appears to be northern in distribution. Mr. Hussey reports specimens from North Dakota and I have specimens from Canada. It may be that the extreme heat of last summer has destroyed our little colony at St. Paul, Minn., for collectors report that they can not find it this summer.

I made one attempt to rear the species, but secured only the egg and first instar stages, which I deem worthy of reporting at this time (see Figs. 3–5). The eggs are quite interesting because they are attached by transparent stalks of considerable length like the eggs of *Porocorixa* in Australia reported just last year by Mr. Herbert M. Hale (Records of the South Australian Museum, Vol. 11, No. 2, Apr., 1922). Eggs laid June 20 showed faint pink ill-defined eye spots on June 25 and all hatched by June 30. The newly hatched bugs were not isolated and one morning I found one nymph that had caught another and midst the feeble protests of the unfortunate victim the captor was slowly sucking out its life blood. They were head to head, the beak of the diner pressed firmly against the forehead of the other. Under the binocular the process was observed and finally, the meal complete, the live bug endeavored to disengage itself, but its stylets held firmly and he swam about dragging the carcass of his brother. At this point I placed the pair in alcohol. Hussey had noted that this species appeared to be predaceous. The front palae are slender instead of broad and spoon-shaped like the common forms, the foraging habits



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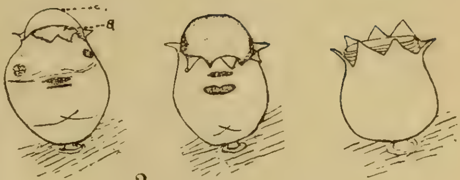

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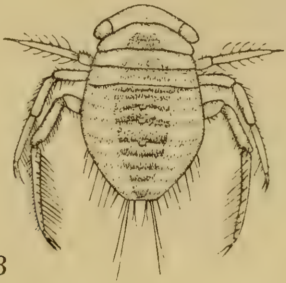

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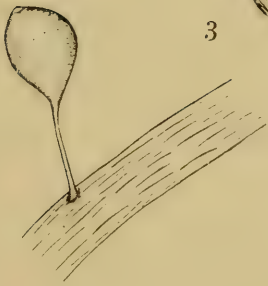

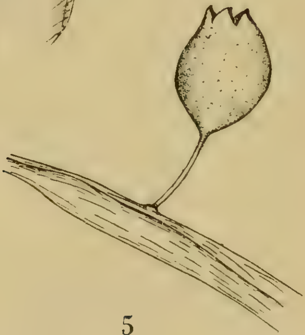

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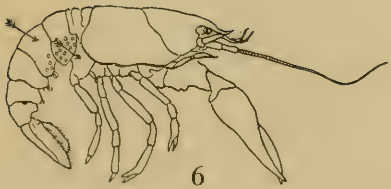

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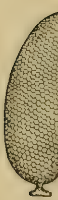

of which are quite different from other aquatic Hemiptera in that they ingest quantities of organic ooze and can readily be shown to eat pure cultures of *Spirogyra* and other algae. The descriptions of the egg and first instar nymph follow:

Egg.—The egg is pearly white when first laid and is anchored to some plant support by a long very slender glossy transparent stalk. The base of the stalk is attached to its support by a small characteristic pad of gelatinous substance. The entire clear flexible stalk appears to be made of the same substance. The egg itself is much like that of any other corixid—asymmetrical with a clear nipple-like apex. In hatching the free end peels back in five or six sections like any other. (See Figs. 4 and 5.) The egg, stalk and all, is about three times as long as wide. The egg and stalk are about equal in length, each being .8 or .9 mm., and the width of the egg about .6 mm.

First Instar Nymph (see Fig. 3) measures about 1.7 mm. long and .9 mm. across the head. The insect is transparent with red eyes when first out of the shell, but becomes somewhat pigmented shortly. The beak is like that of other corixid nymphs and the tarsi are all one segmented, the shape of the front ones much like those of the other legs. The front leg ends in a single claw, while the middle and hind legs are terminated by two long slender claws of equal size and length.

EXPLANATION OF PLATE I.

FIG. 1. Egg of a common boatman, showing the increase in size as embryo develops within.

FIG. 2. Shows stages in the emergence of a nymph: *a,* the bubble like inflated membrane of the post natal molt; *b,* the vertex of the embryo. The second drawings show the embryo after it has advanced into the inflated bubble and the figure on the right the abandoned egg shell and post natal molt.

FIG. 3. First instar nymph of *Cymatia americana* Hussey.

FIG. 4. A newly laid egg of *Cymatia americana* Hussey.

FIG. 5. The same egg after the escape of the nymph.

FIG. 6. Crayfish with eggs on first and second abdominal pleurites. The arrows indicate direction of water current.

FIG. 7. One of the *R. acuminata* Uhl. eggs from Fig. 6 enlarged and reticulate surface shown (any corixid egg shows reticulation if studied carefully).

A RECLASSIFICATION OF THE SUBFAMILIES AND GENERA OF NORTH AMERICAN SYRPHIDAE (DIPTERA).

APPENDIX.

By Raymond C. Shannon, Cornell University, Ithaca, N. Y.

The following key is similar to the one for the subfamilies of Syrphidae published in the Bulletin of the Brooklyn Entomological Society, xvi : 67. It differs mainly in having the aberrant genera keyed out separately, in order to remove certain complications in the preceding key, and not as a substitute, but as a supplement to it. Also a few additional characters have been included and corrections made in terminology. The writer made the mistake in the first key (see above citation) of calling the first posterior cell the discal cell. Wherever the expression "Third vein with a free branch projecting in the discal cell" or "Third vein looped downwards in the discal cell" is made the first posterior cell is meant and not the discal cell.

The keys to the genera given in the previous parts of this paper may stand as they were.

Table of the Subfamilies of Syrphidae with the Aberrant Genera Keyed Separately.

1. Antennae with a terminal style........................2.
   Antennae with dorsal arista........................4.
2. First two antennal joints elongate; anterior crossvein placed at or beyond middle of discal cell; plumula absent. *Cerioides.*
   First two joints short; anterior crossvein placed well before middle of discal cell (*Chilosinae*)..................3.
3. Third antennal joint cylindrical; eyes pilose.....*Callicera.*
   Third antennal joint broadened basally; eyes bare. *Pelecocera.*
4. Antennae elongate; stigmatical crossvein present; third vein with a free branch projecting into first posterior cell (except in *Mixogaster*)..............*Microdontinae.*
   A stigmal crossvein not present in the few forms which have elongate antennae; no free branch projecting into first posterior cell..............................5.
5. Body thickly punctate, nearly bare; arista as short as width of third antennal joint; anal furrow very short; abdomen of both sexes with four visible segments...*Nausigaster.*
   Body not punctate, etc.............................6.

6. The humeral calli and intrahumeral region distinctly destitute of pile; abdomen of both sexes with five visible segments .... *Syrphinae.*
   Pile extending upon humeral region; abdomen of males with four visible segments exclusive of hypopygium...7.
7. Marginal cell closed and petiolate....................8.
   Marginal cell open..............................10.
8. Third longitudinal vein straight; apical crossvein recurrent on distal end.......................... *Volucellinae.*
   Third vein looped downwards into first posterior cell....9.
9. Large, yellow and black species; post stigma opening twice as long as wide; anal vein beyond anal cell strongly bent .... *Milesia.*
   Post stigma one and one half times, or less, as long as wide; last section of anal vein normal..... *Eristalinae,* in part.
10. Part of arista, at least, with long plumosity...........11.
    Arista pubescent or bare...........................12.
11. Anterior crossvein joining discal cell before middle. *Chilosinae,* in part.
    Anterior crossvein joining discal cell at or beyond middle. *Sericomyinae.*
12. Third longitudinal vein with a deep downward loop into first posterior cell; face, except for median stripe, clothed with long pile; a distinct spinose patch present on base of hind femora on exterior side..... *Eristalinae.*
    Third vein usually straight; in forms where it is looped downwards the face is bare and the hind femora are without spinose patch...........................13.
13. Discal crossvein placed before middle of discal cell. *Chilosinae.*
    Discal crossvein joining discal cell at or beyond middle..14.
14. Thorax with bristles (*Chilosinae*).......... *Ferdinandea.*
    Thorax without bristles.................... *Xylotinae.*

ADDITIONAL NOTES.

The subfamily *Sericomyinae* is defined primarily on the structure of the genitalia. This group has unequally developed posterior claspers, or, as Metcalf calls them, styles. Metcalf (Ann. Ent. Soc. Amer., 1921, p. 207) has also noted this very unusual development of the genitalia in *Sericomyia* and *Condidea.* Apparently he did not have *Arctophila* and *Pyritis,* for these genera are not included in his publication.

Temnostoma.—This genus, as well as *Spilomyia* (see discussion under Xylotinae), has the face pilose.

Chilosinae.—A revised key is given in the August (1922) number of the Insecutor Insci. Mens. for the Chilosinae with tuberculate face.

Myioleptini.—This tribe may be characterized by the presence of pile on the humeral region; absence of stigmatical crossvein; position of anterior crossvein before middle of discal cell; dorsal arista; all the femora swollen and spinose on lower side; second longitudinal vein usually turned abruptly upwards to meet costa; third and fourth veins usually meet close to wing margin.

TABLE OF GENERA OF *Myioleptini*.

1. Body thinly clothed with short pile; face black; antennae not elongate........................*Myiolepta* Newm.
   Body and head pile for the most part developed scale-like, tomentose......................................2.
2. Antennae elongate, third joint about six times as long as wide; petiole beyond union of third and fourth veins nearly as long as anterior crossvein...*Lepidostola* Will.
   Antennae normal, third joint not more than twice as long as wide; petiole much shorter than length of crossvein. *Eumyiolepta* Snn.

Lepidostola pulchra Will.—There is a specimen of this species, evidently of the type material, in the Cornell collection. Critical examination of it shows that the genus *Lepidostola* belongs to the *Myioleptini* tribe. Other peculiar characters worth noting in this species are the presence of normal pile on the occiput, arrangement of the mesonotal tomentum in three transverse rows, and the absence of the spurious vein.

Loew has described a species of this genus, *calopus*, from Cuba, and Hine's species, *transversa*, which he describes in the Ohio Naturalist, Vol. XIV, 208, under *Myiolepta*, appears to belong here, too. This species was taken in Honduras.

Eumyiolepta.—TABLE OF SPECIES.

1. Face with a pair of luteous spots...........*strigilata* Lw.
   Face black in ground color, usually heavily silvery pollinose ....2.
2. Tomentum of mesonotum short and arranged in rows. *auricaudata* Will.
   Tomentum generally distributed over mesonotum.......3.

3. Tomentum on mesonotum long, entirely hiding the ground color; abdomen black with transverse pollinose markings. *aurinota* Hine.
   Tomentum short and sparse, easily revealing the ground color; dorsal surface of second and third abdominal segments flat and brownish in male, black in female; no transverse pollinose markings..........**cornellia** n. sp.

Eumyiolepta cornellia n. sp.

Male.—Ocellar region shining black, remainder of ocellar triangle silvery pollinose; frontal triangle silvery pollinose and bearing whitish tomentum except on the shining black patch above antennae; face densely silvery pollinose except on shining black, small rounded tubercle and cheek; occiput silvery, with white tomentum. Mesonotum with sparse, short, pale yellow tomentum; tomentum lighter on pleurae. Legs black, except tips of femora, bases of tibiae, and tips of fore and middle tibiae, which are yellowish; fore tarsi brownish; first and second joints of middle and hind femora yellowish, remaining joints brownish; femora and tibiae clothed with white tomentum. Abdomen with first three tergites colored from grayish to brown, flattened and clothed with very sparse and short black hairs, their sides with longer whitish hairs and tomentum; fourth tergite rounded, black, with yellowish posterior margin, thinly clothed with yellowish tomentum. Wings hyaline, with dusky cloud between tips of first and third vein; halteres yellowish brown; squamae and plumula whitish. Length, 9.5 mm.; wing, 7 mm.

Female.—Front twice as wide at antennae as at ocelli, silvery pollinose, sparsely clothed with white tomentum; antennal frons (a definite bare space in Xylotinae and certain Chilosinae extending across frons above antennae) bare, shining black. Face concave. Abdominal tergites blackish with yellowish margins. Otherwise like the male. Length, 8 mm.; wing, 6.5 mm.

Type, allotype and male paratype: Texas Pass, Ariz., July 20, 1917, J. C. Bradley and R. C. Shannon. Paratype male: Needles, California, April 6, 1918, on willow, J. C. Bradley.

Named *cornellia* in commemoration of the Cornell Biological Expedition of 1917, during which specimens were taken.

The writer has made *Myiolepta bella* Will. the type of a new genus, *Apicomyia* (August number of *Insec. Insci. Mens.,* 1922). Curran states that this species shows relationship with the Criorrhini. At present but two North American species of *Myiolepta* which Williston recognized remain in the genus, *M. nigra* Lw. (entirely black species) and *M. varipes* Lw. (anterior corners of abdomen yellowish). There is a third form, represented by a single female specimen in the Cornell Collection, which appears distinct.

Myiolepta californica n. sp.

> *Female.*—Head over one and one half as broad as high; frons at vertex two thirds the width of frons at antennae; face nearly truncate, but very little produced downwards. Pile everywhere very short and sparse. Anterior corners of second tergite luteous; base of wings, squamae, halteres, and plumula very light yellow; basal section, *i.e.,* before the angle, of apical crossvein greater than length of anterior crossvein; wings hyaline. Length, 9 mm.; wing, 7.5 mm.

Holotype female: Sherwood, Mendocino Co., California, July 1, 1907, J. C. Bradley. This species is closely allied to *M. nigra,* which differs in having the head as high as broad; frons at antennae nearly twice as broad as at vertex; face protruding downwards; base of wings less conspicuously light; wings smoky throughout; legs more contrastingly bicolored (*californica* has black femora, brown tibiae, fore tarsi brownish; first and second joints of middle and hind tarsi dull yellow, remaining joints brownish); the section of apical crossvein before the angle of about half of the length of anterior crossvein; general color throughout shining black.

Curran (Canadian Entomologist, 1922, p. 18) recognizes *M. lunulata* Bigot as being distinct.

Collecting Notes on Lepidoptera.—Two specimens of *Basilarchia astyanax* form *albofasciata* Newcomb were taken by the writer during the summer of 1922, a male at Ogdensburg, New Jersey, on July 10, and a female at Flushing, Long Island, New York, on August 5. A fresh male specimen of *Epimecis virginaria* form *carbonaria* Haimbach was taken at Flushing, New York, on October 28, 1922. This seems to be a late occurrence for this insect, as both the typical and this melanic form are usually found during May, though occasionally an individual is found during the summer months; *carbonaria* is a rather scarce form at any time, females being of much rarer occurrence than males.—E. L. Bell, Flushing, N. Y.

A NEW SUGARCANE MINER.

By J. M. Aldrich, U. S. National Museum.

Ectecephala tripunctata n. sp.

A large, robust, pale-colored species, with a striking black dot on the ocellar triangle and one below each anterior thoracic spiracle.

Female.—*Head* entirely yellow except the ocellar dot and the upper and apical portion of the third antennal joint. Front more than half as wide as the head, frontal triangle smooth and shining, ungrooved, widely separated from the eye on each side, broadly rounded apically, extending nearly to the antennae, which are inserted on a prominence which in profile projects more than half the longitudinal diameter of the eye; there are some noticeable black hairs on the sides of the triangle, as well as near the eyes, but the front and vertex bear only a single bristle, the outer vertical, which is not large. First antennal joint minute, second and third elongate, of about equal length, the latter less than twice as long as deep; arista yellow at base, the remainder white, with white pubescence. Face retreating, unmarked, bucca one third the eye-height, proboscis and palpi yellow.

Thorax entirely yellow except the sharply defined, very shining black dot under the anterior spiracle on each side, and three indistinct reddish stripes on the dorsum; surface of dorsum including scutellum covered with rather dense, short black hair; scutellum of ordinary shape, with three pairs of marginal bristles, including the apicals. *Halteres* yellow. *Abdomen* brownish red without any distinct markings, covered with rather dense black hair. Wings subhyaline, toward apex a little infuscated; the distance between the crossveins is about equal to the last segment of the fifth vein, and fully double the length of the hind crossvein; last segment of fourth vein rather thin, parallel with third almost to tip. Legs wholly yellow. Length 6 mm.

One female, reared from wild sugarcane at Talamanca, Costa Rica, by Carrington B. Williams; of Trinidad, B. W. I.; the adult emerged May 26, 1917.

Type, female, Cat. No. 22361, U. S. Nat. Mus.

The specimen is accompanied by the puparium, which is 9.2 mm. long and 2.2 mm. wide, dark reddish-brown in color, the apices and sutures considerably wrinkled and corrugated. Along the side each of the sutures swings backward in the middle, then again forward. The anterior spiracles are close to the mouth, quite prominent, and each bears some 40 or 50 small protuberances; the posterior spiracles are close together, consisting of the usual three radiating protuberances shaped somewhat like a grain of wheat. The twelfth or terminal segment is set into the eleventh so as to be but little visible from the side, although distinctly so from behind.

The Type Specimens of Lygaeus kalmii Stal subsp. angustomarginatus Parshley (Hemiptera, Lygaeidae).—In connection with the original description of this subspecies (Occasional Papers of the Museum of Zoology, University of Michigan, No. 71, p. 14, 1919) no definite statement of the type specimens was made. The data are as follows: Holotype ♂: South Meriden, Conn., 6–VII–1914 (H. L. Johnson), and Allotype: Boston, Mass., 6–IX–1878, in my collection. Paratypes ♂♀: Green Lake (near Bangor), Maine, 27–VII–1909 (F. A. Eddy); Durham, N. H. (C. M. Weed and W. F. Fiske); Beach Bluff, Mass., 26–VII–1914 (H.M.P.); and Beaver Dam, Wis., 16–VI–1911 (W. E. Snyder), in my collection. Potomac Flats, D. C., 12–VIII–1903 (E. S. G. Titus); Washington, D. C., 14–VIII–1906 (H. D. Clemons); and Walker, Wis., 11–VII–1909, in the United States National Museum. Beaver Dam, Wis., 27–VI–1913 (W. E. Snyder), in the Museum of Zoology, University of Michigan.—H. M. Parshley, Northampton, Mass.

Late Swarming of the Ant Lasius (Acanthomyops) claviger (Roger).—November 7 was one of the many warm and mild days of the remarkably pleasant fall of 1922; but, even if it was warm and mild, ants that normally swarm much earlier in the season were not supposed to undertake their nuptial flight. However, though so late in the year, a colony of *Lasius claviger* decided to send forth their winged males and females on that day, and they swarmed in great numbers about a stone fence post on the grounds of Mr. George L. Egbert, Fort Hill, Staten Island. When some of them were put in a box, and also after they were mounted, the strong odor emanating from them, like that of the oil of citronella, was very noticeable.—Wm. T. Davis.

COLLECTING FLORIDA BUTTERFLIES IN MARCH.

By E. L. Bell, Flushing, N. Y.

A collecting trip to Florida in March, 1921, from the first to the twenty-third, covered principally the territory in the immediate vicinity of Tampa, though some collecting was done at Gulfport, Thonotosassa, and other near-by points.

The season seemed to be somewhat advanced, as was our northern season, owing to the generally mild temperature obtaining throughout the month, and butterflies were in great abundance during the entire collecting period. Florida weather at this time of the year is usually fine, with little rain, and this condition was experienced during the trip, there being but two showers at night and a light rain for about twenty minutes late one afternoon. There were no entirely cloudy days, so there was ample time for collecting every day during the entire trip.

The butterflies principally sought for were the Hesperiidae, but specimens of other groups were collected to obtain the record of their occurrence at this time and those contained in the appended list were in all cases actually collected.

The principal wild flowers at this time attractive to butterflies were thistle, blackberry, and a mint. The blackberry flowers were visited mostly by Hesperiidae, but were difficult to collect on because the net became entangled and torn by the briars. The mint flowers were very attractive to many of the species of butterflies, and especially so to *Papilio marcellus* form *floridensis* Holland, to the Pieridae, and to most of the Hesperiidae; these flowers, however, were past their prime by the middle of the month. The thistles, growing in more or less damp locations, attained an enormous size, in some cases over seven feet in height, and bloomed during the whole month. They furnished most excellent collecting, some species being taken on these flowers exclusively.

Some butterflies rarely, or not at all, frequented the flowers, but were found resting on the vegetation; *Neonympha phocion* Fabricius was usually found resting on the ground, and *Strymon cecrops* Fabricius on leaves of the bushes; *Heliconius charithonia* Linnaeus flying about through the forest; *Prenes panoquin* Scudder on the grass back of the beach along the Gulf.

One specimen of *Megathymus cofaqui* Strecker, a female, was taken in a pine forest. It was found in a small patch of dead weed stalks resting on one of the stalks about six inches from the ground facing upwards with its wings folded closely over its back, and was very inconspicuous in this position, the coloring of its undersurface blending very nicely with its surroundings, and it probably would not have been seen at all had it not been disturbed by my walking through the weeds and seen to alight on the stalk. There was no underbrush and very little green vegetation in this dry, sandy forest, it having been grazed over by herds of cattle, and large areas burned over by forest fires. There were no yucca species growing near the weed patch where the specimen was taken, and a systematic search of the territory for some distance revealed but three very small yucca plants which bore no trace of *Megathymus* workings, and though several more trips were made through this forest, no more specimens were seen.

A few flown specimens of *Calpodes ethlius* Cramer were taken on the thistle flowers. They were very wary and difficult to capture, usually darting away before one could approach near enough to catch them.

Some species were just appearing when the trip ended and another week would have probably added to the list.

A few larvae of *Danaus archippus* Fabricius, in different stages of development, were found feeding upon a milkweed.

It may be that at some other points than those at which the collecting was done some of the species recorded in the accompanying list as not common might have been found in greater abundance; for instance, in the immediate vicinity of Tampa no specimens of *Neonympha phocion* Fabricius were found, while at Gulfport it was quite common.

Very few snakes were seen and those were harmless. There were several lizards, the pretty little chameleon *Anolis carolinensis* Cuvier being perhaps the commonest seen, infesting the thistles in quite some numbers and preying upon the insects frequenting the flowers. They were observed several times to capture and eat the common Hesperid, *Polites brettus* Boisduval.

This list of 63 species and 1 form collected within the period stated at the beginning of the article follows Barnes and McDunnough's check list in nomenclature:

Papilio philenor Linnaeus, common.
Papilio polyxenes asterius Cramer, common.
Papilio cresphontes Cramer, common.
Papilio glaucus Linnaeus, common.
Papilio glaucus form ♀ *turnus* Linnaeus, few.
Papilio troilus texanus Ehrman, common.
Papilio palamedes Drury, common.
Papilio marcellus form *floridensis* Holland, very common.
Pieris monuste Linnaeus, common.
Pieris rapae Linnaeus, 2 specimens.
Nathalis iole Boisduval, common.
Catopsilia eubule Linnaeus, common.
Zerene caesonia Stoll, common.
Eurema nicippe Cramer, common.
Eurema euterpe Menetries, common.
Eurema delia Cramer, not common.
Danaus archippus Fabricius, few.
Danaus berenice Cramer, common.
Neonympha phocion Fabricius, common locally.
Cissia sosybius Fabricius, very common.
Heliconius charithonia Linnaeus, 3 specimens.
Dione vanillae Linnaeus, common.
Phyciodes phaon Edwards, common.
Phyciodes tharos Drury, common.
Vanessa atlanta Linnaeus, 1 specimen.
Vanessa virginiensis Drury, common.
Junonia coenia Huebner, common.
Basilarchia astyanax Fabricius, 1 specimen.
Basilarchia archippus floridensis Strecker, common.
Calephalis virginiensis Gray, common.
Strymon cecrops Fabricius, common.
Strymon melinus Huebner, common.
Brephidium isophthalma Herrick-Schaeffer, 1 specimen.
Hemiargus hanno Stoll, 1 specimen.
Goniurus proteus Linnaeus, common.
Epagyreus tityrus Fabricius, common.
Cocceius pylades Scudder, common.
Thorybes daunus Cramer, not common.
Thanaos brizo somnus Lintner, common.
Thanaos juvenalis Fabricius, common.
Thanaos horatius Scudder & Burgess, common.

Thanaos terentius Scudder & Burgess, common.
Ancyloxypha numitor Fabricius, not common.
Pamphila attalus seminole Scudder, common.
Hylephila phylaeus Drury, very common.
Polites cernes Boisduval & Leconte, common.
Polites baracoa Lucas, common.
Polites brettus Boisduval, very common.
Atalopedes campestris Boisduval, very common.
Catia otho Abbot & Smith, not common.
Atrytone logan Edwards, not common.
Atrytone arogos Boisduval & Leconte, not common.
Euphyes arpa Boisduval & Leconte, common.
Euphyes palatka Edwards, 3 specimens.
Atrytonopsis loammi Whitney, common.
Amblyscirtes vialis Edwards, common.
Megistias fusca Grote & Robinson, common.
Lerema accius Abbot & Smith, common.
Lerodea eufala Edwards, common.
Lerodea maculata Edwards, very common.
Calpodes ethlius Cramer, 3 specimens.
Prenes panoquin Scudder, locally common.
Prenes ocola Edwards, not common.
Megathymus cofaqui Strecker, 1 specimen.

Lepidocricus herricki Pierce.—In 1921 a single specimen of this otiorhynchid beetle was taken at Cincinnati, Ohio. In May, 1922, they suddenly appeared in great numbers. Their greatest abundance was on May 24. By June 21 not one could be found. They were swept from "horse weeds," *Ambrosia trifida*, growing along the edge of an old channel of the Little Miami River. Pierce's types were from Mississippi, where it is reported as attacking cotton. The generic description given in *Rhynchophora of North America* by Leng & Blatchley, p. 126, is misleading where it says "Beak separated from head by a deep constriction," leaving out the word "beneath" of Pierce's original description, Jour. Econ. Entomol., Vol. 3, p. 362. Through the courtesy of Drs. Howard and Chittenden the Cincinnati specimens were compared with the types in the National Museum, where specimens were deposited.—Charles Dury, Cincinnati, Ohio.

PHASIA (PHORANTHA) OCCIDENTIS WALKER,[1] AN INTERNAL PARASITE OF THE FALSE CHINCH BUG.

By F. B. Milliken[2] and F. M. Wadley, Scientific Assistants,
United States Bureau of Entomology.

This fly was first reared from the false chinch bug at Garden City, Kans., in 1913. Further work on it was done there in 1914, and at Wichita, Kans., in 1916.

SYSTEMATIC POSITION AND HISTORY.

The species has been reported from the following localities: Ft. McLeod, Canada; Maryland; southern Illinois; Georgia; Nueces, Texas; South Dakota; Cañon City, Colorado; Las Cruces, N. M.; Washington; southern California; Allende, Mexico. To this list Garden City and Wichita, Kansas, may be added.

Coquillet's key[3] gives the following characters for distinguishing the species from others of the genus: "Black, calypteres whitish, second and third segments of abdomen thinly whitish pollinose, frontal vitta of female at the narrowest point less than one-third as wide as the distance between the posterior ocelli; length 2.5 to 5 mm."

OTHER STAGES.

The egg has not been observed.

The *larva* is typical of the group, being a whitish, footless maggot, with dark chitinous mouth-parts adapted for rasping. It is very active during its brief period of external dipterous puparium. The *pupa* is hard, brown, rather bullet-shaped, about 2.5 mm. long, and bears two short blunt spines at the posterior end.

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[1] Order Diptera; family Tachinidae.

[2] Resigned December 31, 1919.

[3] Coquillet, D. W., "*A Revision of the Tachinidae,*" U. S. Div. Ent., Tech. Bull. 7, 1897.

LIFE HISTORY AND HABITS.

THE LARVA.

The larva of *Phasia occidentis* lives in the abdominal cavity of *Nysius ericae*. The writers are not aware of its being parasitic on any other species.[4] Of the false chinch bugs the females are much more frequently parasitized than the males, only a few parasitized males having been found. Only one maggot is found in a host. At Garden City, Kans., in 1914, many females confined for eggs were found to be parasitized. When nearly grown the maggot greatly distends the abdomen of the host, sometimes to such an extent that the ovipositor is thrust downward and the wings upward. In the earlier stages of parasitism infested females can not be distinguished from gravid females. In most cases the maggot emerges in from one to four days after the host was confined. Emergence always leaves the bug dead or dying, with a shrunken and empty abdomen.

Some adult bugs, newly molted and still colorless, were confined on July 23, 1914. One female showed signs of parasitism by July 28 and died August 10. Dissection revealed an immature maggot. This female when taken had been mature not longer than 20 minutes, and there was no subsequent chance for infestation. The development of the parasite in this case was slow; however, females that were very much distended have gone for several days before yielding the maggot, and all females in the later stages of parasitism appear to have been mature for some time.

These facts make it seem probable that infestation occurs in the later nymphal stages, or possibly at the time of the last molt, and that the combined egg and larval periods of the parasite require 15 to 18 days.

THE PUPA.

On emerging from the host the larva wriggles actively about seeking a place in which to pupate. Loose surface soil, tunnels of earthworms, rubbish, and similar places offer the desired conditions. Transformation follows, usually within an hour after emergence. In summer temperatures the pupal period lasts from 5 to 7 days, averaging 6, but in the cooler weather of May and September it varies from 8 to 11 days.

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[4] Since this was written Mr. Luginbill, in U. S. Dept. Agri. Bull. 1016, has announced rearing this species from *Blissus leucopterus* Say, and mentions that Mr. D. Leonard reared it from *Miris dolabratus* L.

THE ADULT.

The fly does not live long in confinement. One was kept alive for 7 days after emergence, but no others for longer than 3 days. They feed readily on sugar water.

Copulation has been observed within a few hours after emergence. Repeated efforts to secure infestation of false chinch bugs by *Phasia* in the laboratory have failed. Later-stage nymphs, newly emerged, and older adults have been confined with adults of *Phasia,* but with no success. Infestation has never been observed in the field, though careful watch has been kept. From the known habits of other tachinids, it seems probable that the fly deposits an egg on the body of the host, and the larva on hatching bores its way in. The adults of *Phasia* have been found on various weeds and flowers in summer.

LIFE CYCLE.

From the above data, the life cycle in summer requires about 25 days, allowing for a pre-oviposition period. In this respect the life cycle of the parasite bears a close relation to that of its host. Its egg and larval stages should correspond to the pre-oviposition and oviposition periods of *Nysius,* as also to the later nymphal stages. The pupal and pre-oviposition periods of *Phasia* would then correspond to the egg and early nymphal stages of the host.

SEASONAL HISTORY.

The parasite is active almost as early in the spring as *Nysius ericae,* appearing in May, and continuing active in October. There must be a number of generations, the life cycle being short, with *Nysius* probably having several generations at Garden City. Pupae have been found at Garden City in November. From this it appears probable that *Phasia* hibernates in the pupal stage.

IMPORTANCE.

This parasite kills a rather constant percentage of the females of *Nysius cricae* at Garden City. In 1914, of 220 confined for eggs, 17, or 7.7 per cent., were parasitized. Many other females were recognized as containing parasites and held for rearing them. The destruction of males by the parasite is negligible! *Phasia* is present, but scarce, at Wichita, Kans., only one parasite having been reared from the many false chinch bugs collected during the two years' work there.

Another factor to be considered is the effect of parasitism on the reproductive capacity of the host. Our data shows that with few exceptions parasitized females deposit no eggs. On the whole, *Phasia occidentis* is to be considered as one of the minor checks on *Nysius ericae.*

A NEW SPECIES OF LABOPIDEA ON GARLIC (HETEROPTERA–MIRIDAE).

By Harry H. Knight, University of Minnesota, St. Paul.

Labopidea allii new species.

Smaller and more slender than *sericata;* head, pronotum, and scutellum more distinctly flattened, rostrum reaching only to middle of sternum.

Female.—Length 4 mm., width 1.28 mm. *Head:* width .90 mm., vertex .58 mm. *Rostrum:* length .83 mm., scarcely reaching to middle of sternum. *Antennae:* segment I, length .36 mm., width .12 mm.; II, 1.14 mm., thickness .057 mm., cylindrical, pale yellowish, clothed with fuscous pubescence. *Pronotum:* length .51 mm., width at base 1.17 mm., anterior angles .78 mm.

Greenish yellow, the hemelytra more nearly green but somewhat translucent; clothed with rather prominent, suberect pale pubescence, head and pronotum with more closely appressed silvery sericeous tomentum. *Membrane* pale, tinged with fumate, veins becoming green. Apex of rostrum and tips of tarsi fuscous.

Holotype: ♀ April 19, 1921, Jackson, Missouri (A. C. Burrill); author's collection. Nymphs and adults were taken on wild garlic where the species was found breeding in considerable numbers.

A NEW NORTH AMERICAN SPECIES OF THE GENUS BECKERINA (PHORIDAE, DIPTERA).

By J. R. Malloch.

The genus *Beckerina* Malloch contains but two described North American species, *luteola* Malloch and *orphnephiloides* Malloch. I herewith add another species and present a key to the species known to me. The genus I have defined in my paper on the family in the Proc. U. S. N. M. in 1912.

Beckerina spp.

1. Yellow species; thorax with 3 reddish vittae; scutellum with 2 bristles .... *flaveola* Malloch.
– Black species; thorax entirely black; scutellum with 4 bristles .... 2.
2. Large species, 5 mm. in length; costa ending at about one third from apex of wing; halteres yellow. *orphnephiloides* Malloch.
– Smaller species, averaging 2.5 mm. in length; costa to middle of wing or slightly beyond it .... 3.
3. Halteres yellow; scutellum with the median pair of bristles much weaker than the outer pair .... **similata** sp. n.
– Halteres black; scutellum with 4 subequal bristles. *umbrimargo* Becker.
– Halteres fuscous; scutellum with 4 equal bristles. *neotropica* Brues.

Beckerina similata sp. n.

Female.—Black, slightly shining. Antennae and palpi brownish yellow. Apices of abdominal tergites narrowly clay colored. Legs brownish yellow, the front pair paler. Wings clear. Halteres with yellow knobs. Frontal bristles very stout, preocellar series straight, anterior series slightly curved forward; postantennal pair of bristles not very long, some of the adjacent setulae nearly as conspicuous; third antennal segment round, arista longer than width of frons, microscopically pubescent; palpi of moderate size, with short stout bristles below. Thorax as in other species. Legs not as stout as in *umbrimargo*. Costa to wing middle, setulae rather close, not over twice as long as width of costa, first costal division a little longer than 2 + 3, third fully half as long as second. Length, 2 mm.

Type, Glen Echo, Md., May 14, 1922 (J. R. Malloch).

This species is evidently very closely related to *neotropica* Brues, but the latter has the third antennal segment and knobs of halteres fuscous, and the abdominal tergites largely yellow, the apices only being black. The third section of costa is also shorter in *neotropica.*

A NEW FORM OF CATOCALA GRACILIS EDWARDS.

By T. D. Mayfield, Newark, N. J.

Catocala gracilis aberr. **lemmeri** n. aberr.

A very strikingly marked aberration of *C. gracilis* Edwards differs from the normal form in having the scales of the thorax and patagia solidly blackish, the dark suffusion along inner margin of primaries broad and extremely dark, obscuring the transverse lines, median space from base to outer margin filled with very light scales nearly reaching costa at base. Secondaries and underside as in normal form.

Described from one ♂ and four ♀♀ taken at Lakehurst, N. J., from July 6 to 21.

Holotype ♂, allotype, and paratype in collection of the author. Paratypes in collection of Otto Buchholz and Frederick Lemmer.

The North American Species of the Chloropid Genus Cetema (Diptera).—Becker in his paper on the Nearctic Chloropidae in 1912 listed two species of this genus from the United States, one, *hypocera*, being described as new. This last species is a synonym of *subvittata* Loew, described strangely enough as an *Oscinis*. Though Becker redescribed this species in the genus *Oscinis*, he did not detect the fact that it was the same species as he described in *Cetema*. The other species is *procera* Loew. I have taken both species at Glen Echo, Md.—J. R. Malloch, Washington, D. C.

A Hymenopterous Parasite of Epargyreus tityrus Fabricius.—From a pupa among a number obtained from larvae collected at Flushing, New York, during September and October there emerged on April 23 following a specimen of *Amblyteles duplicatus* Say. In emerging the parasite completely severed the head of the pupa.—E. L. Bell, Flushing, N. Y.

EDITORIAL.

To Authors.

Changed conditions of printing call for changed practices in our publication.

It will no longer be possible to accept for publication papers with extensive tabulated statistics, unless the authors consent to pay the added cost of this form of composition. The expense of setting up tabular matter is extremely high, and we feel that though it may be necessary in certain forms of work, it crowds out more widely interesting matter, and perhaps belongs more properly in a publication for specialists.

The number of free reprints for papers three fourths of a page or less in length will be limited to 10 only, in loose sheets without change in form or the usual credit line. If reprints are desired, they must be ordered at the time the paper is submitted, and they will be charged at the regular rates for all over 10.

The usual 25 free reprints will be allowed authors, as has been our established practice. For those in excess of the 25 allowed the charge will be as follows: Up to 50, 6 cents for 4 pages or less per copy, plus 1 cent for each additional 4 pages or less—thus: 1, 2, 3, or 4 pages, 6 cents a copy; 5, 6, 7, or 8 pages, 7 cents a copy; and so on. Over 50 to 100 reprints, 5 cents and 1 cent, as above, for each four pages or less; over 100 copies, 4 cents and 1 cent. Covers have risen in price and, as usual, will be furnished only on request, at the following prices: 25 covers, $2; 50, $2.45; 100, $3.30; 150, $4.15; 200, $5. Larger quantities will be charged at a small advance over cost.

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BOOK REVIEW.

Entomology with Special Reference to Its Ecological Aspects, by Justus Watson Folsom, Sc.D. Third revised edition with five plates and 308 text figures, pp. i–vii + 1–502 (P. Blakiston's Son & Co., Philadelphia, $4.00).

The third edition of this excellent work presents in extremely readable form the biological as distinguished from the exclusively taxonomical side of insects. We know of no other work in English that fills quite the same place. In this edition it has been much revised and brought measurably to date. It differs from the first (1906) edition in the omission of the chapter on Origin and Adaptation of Insects, and the addition of two chapters (Chaps. IX and XIII), on Transmission of Disease by Insects and Insect Ecology, respectively. Much of Chapter XIII is directly quoted from Shelford's "Animal Communities" and other writings. In fact, Dr. Folsom distinctly sets forth his great appreciation of Shelford's ecological work.

Those that possess the first edition of this splendid work should also have the third, which makes many changes and is practically a new work. Those entomologists by profession or avocation whose libraries lack this work should fill the deficiency now. The bibliography alone lists a large number of additions showing the work done since the first edition; and the progress of ecology in the last 15 years has materially changed many earlier ideas on succession of species, distribution, and occurrence.

It is always possible to point out things that could be corrected or improved upon, but only one general comment is here made. In so extensive a work as this it is impossible for any one man to keep abreast of *all* the scientific writings of the day, whatever their importance. It would seem an added assurance of accuracy were the MS. for another edition to enjoy the scrutiny of group specialists to insure the omission of any debatable statements, or of those rendered obsolete by recently published (or even unpublished) special research. Entomologists have one excellent trait—they are ever ready to help one another.

The book itself has an excellent letter-press; typographical errors, if any, are few and not material; the binding, however, in common with current binding work, seems not strong enough to stand heavy wear; and the paper is thinner, so that the book, although it has about 50 pages more than the first edition, is about one third less thick.—J. R. T. B.

EXCHANGES.

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

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Vol. XVIII APRIL, 1923 No. 2

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

Smithsonian Institution
JUN - 2 1923
National Museum.

NEW SERIES

PUBLICATION COMMITTEE
J. R. de la TORRE-BUENO,
Editor
DR. J. BEQUAERT GEO. P. ENGELHARDT

Published by the Society

Price, 35 cents Subscription, $1.50 per year

Mailed May 23, 1923

Entered as second-class matter January 21, 1919, at the postoffice at Lancaster, Pa.,
under the Act of March 3, 1879

The Brooklyn Entomological Society

Meetings are held on the second Thursday after the first Tuesday of each month from October to June, inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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CONTENTS

NEW SPECIES OF COLEOPTERA FROM CALIFORNIA, Van Dyke 37
NEW SPECIES OF TENTHREDINIDAE FROM THE EAST AND MIDDLE WEST, MacGillivray 53
ANOTHER REMINISCENCE OF EARLY DAYS, Bather 56
NOTICE—INDEX FOR VOL. XVII 57
THE LARVAL STAGES OF LEMNOPHORA DISCRETA, Marchand 58
ORTHOCEPHALUS MUTABILIS, Stear 62
ALTICA OR HALTICA? Woods 63
OBSERVATIONS ON THE OCHTERIDAE, Takahashi 67
PROCEEDINGS OF THE SOCIETY 69

Bulletin of the Brooklyn Entomological Society

Published in
February, April, June, October and December of each year

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11 North Broadway, White Plains, N. Y.

BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

VOL. XVIII APRIL, 1923 No. 2

NEW SPECIES OF COLEOPTERA FROM CALIFORNIA[1]

BY EDWIN C. VAN DYKE, University of California, Berkeley, Cal.

The Coleoptera dealt with in this paper are some of the undescribed species which have been recently secured.

FAMILY RHIPICERIDAE.

Sandalus cribricollis n. sp.

Black with rufous elytra, the apices blackish, subopaque. Head very closely, deeply, cribrately, and moderately coarsely punctured and clothed with long coarse grayish-brown hair. Prothorax slightly less than three-fourths as long as broad, anterior margin straight and three-fourths breadth of base, sides arcuate and gradually convergent anteriorly, hind angles blunt, the disc with evident median longitudinal sulcus and very coarsely, deeply, and cribrately punctured with finer punctures intermixed and pubescent like the head. Scutellum depressed anteriorly and closely, rather finely punctured. Elytra very coarsely, deeply punctured, the punctures more or less arranged in rows and forming a very definite reticulation, and with several vague longitudinal carinae. The tarsi rather slender, the joints feebly emarginate, and the lamellae small and inconspicuous. Length 19 mm., breadth 6 mm.

This species, though superficially looking like one of the bicolored phases of *S. niger* Koch., belongs nearer *S. californicus* Lec. because of the narrow tarsi, but it can be readily separated from this, as well as from all our other species, by the very coarsely and cribrately punctured head and prothorax.

---

[1] This paper is the sixth of a series of short papers dealing with the Coleoptera of this country to be published by me in this journal. The last one appeared in 1920.

Type, a unique male in my collection, captured near Loyalton, Sierra Co., California, September, 1918, by Mr. E. Ralph de Ong, who very kindly presented it to me.

FAMILY BUPRESTIDAE.

Chrysobothris bacchari n. sp.

Size and form of *C. mali* Horn, subdepressed, upper surface brassy, beneath more cupreous, antennae and margin of clypeus somewhat greenish. Head with front slightly convex, with two vague callosities between the eyes and a distinct Y-shaped smooth area on vertex; clypeus emarginate, the margins evenly arcuate; the antennae gradually narrowed toward tip, third joint almost as long as the next two, subcylindrical and but little dilated externally, the fourth distinctly longer than broad, the fifth just perceptibly so, the following transverse. Prothorax twice as wide as long, sides straight and almost parallel at middle, oblique and convergent anteriorly and posteriorly; disc moderately convex, sparsely and finely punctured, with a shallow though well defined median longitudinal sulcus, its boundaries slightly elevated and transversely strigose, the sides anteriorly rather deeply longitudinally impressed. Elytra with humeri rounded, the sides obliquely convergent in front of the same, almost parallel at middle and slightly arcuate and convergent to posterior angles which are separately rounded, the apical margin finely serrulate; disc with four costae on each elytron, a sutural vague in front but sharply defined at middle and behind and gradually curving away from suture posteriorly, a median broken up into three portions by two shallow foveae, the basal part short and irregular, the second distinct and straight occupying the middle one-third of elytra, and apical also distinct but slightly curved, more distant from the suture, and not reaching apex of elytra, a distinct humeral costa extending from near the long humeral umbone and obliquely curving inwards to beyond the middle of the elytra where it ends at a large fovea and a submarginal which is less clearly defined and runs along the sides from near the umbone to close to the apex of the median costa, the depressions rather finely and sparsely punctured inwardly and more closely punctured and scabrous outwardly. Body beneath rather coarsely, closely punctured anteriorly, the abdomen more finely punctured and strigose; prosternum lobed at middle in front and finely sparsely pilose, last ventral with margin serrulate. Anterior femora with a broad obtuse tooth, serrulate on outer margin. Length 9 mm., breadth 4 mm.

♂. Front of head with punctuation sparse and fine in the center, coarser on margins and densely clothed with suberect white pile; anterior tibiae abruptly dilated at apex, the dilatation rounded inwardly and emarginate before apex; last ventral segment deeply semicircularly emarginate at apex, the last dorsal coarsely punctate and notched at apex.

♀. Front of head with punctuation moderately coarse and regularly distributed and but sparsely pilose; anterior tibiae moderately arcuate, gradually wider to tip; last ventral segment with shallow semicircular notch at apex, last dorsal coarsly punctate and blunt at apex.

For a number of years this species has been known to a number of us, and though always associated with *C. mali* Horn, to which it is undoubtedly related, was felt to be distinct. We, however, did not have sufficient material nor field data to warrant us in separating it until recently, when, through the efforts of Mr. H. E. Burke, a large enough series of specimens was secured to enable us to definitely fix its status. It is of a uniform brassy color like *C. texana* Lec., whereas *mali* is generally of a deep purplish bronze color with the front greenish and sides of prothorax, elytral foveae and apices cupreous; the head is more convex, the clypeus less deeply and acutely emarginate, and the front less coarsely and closely punctured; the median prothoracic sulcus is well defined, whereas it is shallow and poorly defined in the other; and the elytral costae are distinctly elevated and defined in contrast to those of the other, where the general surface is also very coarsely, evenly, and closely punctured. In the male of *bacchari* the prosternum is sparsely clothed with pile as in the female, while in *mali* it is clothed with long white pile, and the dilated apex of the anterior tibiae is evenly enlarged, while in *mali* it is not only less developed, but has the anterior portion notched.

A series of twenty specimens has been seen and from the following localities: Fairfax, Marin County, June 24, 1908; Los Gatos, June 27, 1918, and July 7, 1917; Laurel, May and June, 1917, all in California; and Sabino Canyon, Arizona, September, 1917. The Fairfax specimen was collected by myself, the other California specimens collected or reared by Mr. H. E. Burke and Mr. F. B. Herbert, and the Arizona specimens by Mr. Geo. Hofer. The California specimens submitted by Mr. Burke were all bred from *Baccharis pilularis* D.C., the "Chaparral Broom" a very common and worthless shrub cf the family Compositae, and the Arizona material from a closely related species, *Baccharis sergiloides.* There is some variation as to size, the Arizona specimens being uniformly larger, the largest 12 mm. in length, and with a tendency to have the head somewhat cupreous. The sculpturing also varies to a minor degree, particularly as to the length or interruptions of the median and humeral elytral costae.

Type male and allotype female, in my collection, from Los Gatos, California, June 27, 1918, reared by Mr. H. E. Burke from *Baccharis pilularis* D.C. Several designated paratypes are in the collection of Mr. Burke and myself.

Chrysobothris lineatipennis Van Dyke.

This insect, I now believe should rank as a distinct species, not as a variety of *C. mali* Horn. Within recent years a very large series of the latter has been taken and from many localities. The specimens show a great degree of constancy of structure. Even those from Southern California are like the more northern specimens and not like *lineatipennis.* Mr. Burke fully agrees with me in this matter.

Agrilus sierrae n. sp.

Moderately robust, a dull brassy bronze, very finely sparsely pilose without pubescent spots either above or beneath but with pro- and mesosternum densely clothed with erect, white pile. Head, from above, concave, a moderately deep impression from the occiput to the clypeus, rather roughly granulate-strigose, sparsely pubescent; clypeus broadly emarginate anteriorly and with rounded lobes laterally; antennae piceous, serrate from the fifth joint, reaching the middle of the prothorax. Prothorax very little wider than long, slightly narrowed posteriorly; sides feebly arcuate in front, oblique and barely sinuate to hind angles, which are rectangular and with a straight, well-defined carina; the lateral margin sinuate and suddenly depressed anteriorly, forming a very acute angle with the anterior margin; the disc convex, with a vague median longitudinal impression, lateral oblique impression distinct, surface closely transversely strigose; anterior margin distinctly lobed at middle. Scutellum transversely carinate. Elytra feebly sinuate at sides and only slightly broader posteriorly, apices rounded and very finely serrulate; the disc slightly flattened, with a vague channel each side of suture, basal foveae feeble, surface moderately closely but not roughly imbricate and without pubescent spots. Body beneath more shining than above,

> moderately coarsely closely punctured in front and finely sparsely over abdomen, the prothoracic submarginal line sinuate; pygidium sparsely punctate, not carinate; claws broadly toothed. Length 6 mm., breadth 2 mm.
>
> ♂. Front of head with longitudinal depression only, prosternal pile long, dense, and erect, the first two ventral segments feebly impressed along the median line.
>
> ♀. Front with crescentic, transverse impression in addition to median, the prosternal pile less long and more depressed, the ventral segments not impressed.

This species belongs next to *Agrilus addendus* Crotch, in all probability is an offshoot from the same stock, looking very much like the phase of that species which lacks the pubescent spots. It is distinct, though, and in several particulars, for instance, in having the front of the head much less convex, the clypeal emargination shallow and broadly rounding off at the sides in contrast to one with more or less angular boundaries, the prothorax with its anterior margin less lobed, the lateral margin more sinuate and meeting the anterior margin at a more acute angle, the prosternum quite pilose in both sexes, and the apices of the elytra with very much more minute serrulations.

Type male, allotype female, and one paratype in my collection, captured in Mariposa County, California, June 12, 1914, by Mr. F. W. Nunenmacher.

FAMILY PTINIDAE.

Hedobia semivittata n. sp.

> Oblong, elongate, black with rufous areas beneath the pilose patches on the elytra, and clothed with short recumbent cinereous hair which is uniformly distributed over the head, legs and under side of body, covers the sides of prothorax and forms a distinctive design on the elytra. Head rather coarsely granulose, without median smooth line, front more than twice as wide as vertical diameter of eyes; eyes but moderately prominent; antennae reaching middle of elytra, third joint slightly longer than fourth, the tenth twice as long as wide. Prothorax about as wide as long, slightly constricted behind apex, sides evenly arcuate posteriorly, base broader than apex, disc distinctly elevated at middle and compressed posteriorly forming a market crest that is truncate at apex and sparsely clothed with short brown hair, surface rather coarsely, somewhat closely punctured. Scutellum elongate, rather suddenly narrowed posteriorly (evidently longer and narrower than in

granosa) and densely clothed with white pile. Elytra not quite twice as wide as prothorax, fully twice as long as wide, sides parallel, surface confusedly granulate punctate, with rows of hardly evident tubercles, and with the cinereous pile arranged on the disc as follows: as an illy defined sutural vitta extending to declivity, three well-defined but interrupted vittae without this, also extending to the declivity, and in a broad band at the sides, the apex black and partly denuded, partly clothed with black or brown hair except at margin where the white hair is again evident; the margin finely serrulate posteriorly. Beneath moderately, closely, coarsely punctured, fifth ventral truncate-emarginate at apex and with triangular impression in front of it. Tibiae granulate along outer margin, first tarsal joint of middle and hind legs as long as following four united. Length 6 mm., breadth 2.75 mm.

This species is readily separated from our two other species by being generally longer and by having a different type of ornamentation, a vittate arrangement of the elytral pubescence as contrasted with the balteate, found in the others. It is interesting to note that the three American species of *Hedobia* are Californian, the remainder mainly Holarctic, a peculiarity of distribution shared by many of our genera such as *Brychius, Dascillus,* the typical *Rosalia,* and so forth. In this connection, I also wish to report that the larvae of *Hedobia granosa* Lec., which breed very commonly in old live oak twigs in the San Francisco Bay region, spin a loose cocoon, very similar in appearance to those made by the weevils, *Hypera* and *Phytonomus.*

Type, a unique in my collection, beaten by myself from black oak, *Quercus kelloggii* Newb., in the Yosemite Valley, California, May 26, 1921.

Ernobius caudatus n. sp.

Moderately robust, elongate, rufo-piceous, the prothorax and suture at apex lighter, uniformly clothed with rather short, sparsely placed, and recumbent grayish-yellow pubescence. Head granulate-punctate; eyes prominent in male, hemispherical, less prominent in female; width of front in male twice vertical diameter of eyes, greater in female; antennae eleven jointed, two-thirds length of body in male, shorter in female, joints 3, 4, 6, and 8 nearly equal, 5 and 7 a little longer, 6 to 8 more than twice as long as wide, 9 slightly shorter than three preceding united. Prothorax as wide as elytra, about a third wider than long, sides moderately arcuate and strongly margined, front angles rounded, surface densely granulate-punctate; disc with small crista at middle near base, and depressions on either side midway between it and sides. Elytra about twice as long as broad, the apices distinctly produced at suture and subacute, less prominent in females, punctuation similar to that of pronotum. Beneath rather coarsely, closely punctured in front, finely and sparsely over abdomen. Length 4 mm., breadth 1.5 mm.

Type male and allotype female in my collection, beaten by myself from Sargent's Cypress, *Cupressus sargenti* Jepson, on Cypress Ridge, Marin County, April 2, 1922. I have also twelve other specimens taken at the same place, at various times during the months of April and May.

This species belongs in the group with *mollis* Linn., *socialis* Fall, *punctulatus* Lec., *cupressi* Van Dyke, and the recently described *conicola* Fisher,[2] as defined by Fall,[3] but differs from them, as well as from all other species with which I am acquainted, by having the elytra definitely produced at the apical suture into subacute dentations. In addition, it differs from *socialis* by being distinctly smaller and more piceous; from *punctulatus* by color, shorter pile, and by the joints 6–8 of the antennae each being distinctly twice as long as broad; and from *cupressi* by being much smaller and by having the ninth antennal joint only slightly shorter than the three preceding, it being shorter than the two preceding in the latter. It is the third California species to be described as from our species of cypress, *cupressi* Van Dyke[4] and *conicola* Fisher being the others. As regards *conicola* Fisher, I am inclined to believe that it is synonymous with my *cupressi*.

FAMILY BOSTRICHIDAE.

Polycaon granulatus n. sp.

Elongate, subcylindrical, opaque, black except last three joints of antennae and tarsal claws which are castaneous, and lateral margins of elytra which are indistinctly rufescent, clothed above with a short, black prostrate pile interspersed with a scattering of longer erect hairs, and beneath with a cinereous and finer prostrate pubescence. Head including the eyes broader than prothorax, front convex and granular, the clypeal margin broadly and shallowly emarginate; eyes very convex, each a complete hemisphere and together over one-half breadth of head between them; antennae ten-jointed, the last three enlarged, forming an open club which is longer than the rest of the antennae. Prothorax slightly broader than long, sides broadly rounded anteriorly, subsinuate posteriorly; disc convex, granular, median longitudinal line slightly impressed, the anterior transverse impression shallow; the propleurae perceptibly convex. Elytra slightly more than four times as long as prothorax and two-thirds broader, quite convex and decidedly granulose, without carinae or tubercles, the apices of each elytron in male incised and bidentate, in female simple. Front tibiae moderately robust, serrate externally, straight and without basal internal excavation. Second and third tarsal joints securiform. Male, length 10 mm., breadth 3.5 mm.; female, length 8 mm., breadth 2.5 mm.

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[2] "Five New Species of Ptinid Beetles," by W. S. Fisher, No. 2271 Proc. U. S. Nat. Mu., Vol. 55 (1919), pp. 296–297.

[3] "Revision of the Ptinidae of Boreal America," by H. C. Fall, Trans. Am. Ent. Soc., Vol. XXXI (1905), p. 140.

[4] "Some New Beetles in the Families Cantharidae (Lampyridae) Ptinidae, and Scarabaeidae, from Western North America, with Notes Upon Others," by Edwin C. Van Dyke, BULL. BROOKLYN ENT. SOC., Vol. XIII (1918), pp. 6–7.

This species superficially resembles a small female of *Polycaon stoutii* Lec., and was in fact taken to be a very small phase of the same for some time. It differs, however, from that species in having the antennae ten-jointed instead of eleven, the eyes more convex and prominent, the clypeus not depressed anteriorly, the body above more definitely granulose than even the most roughened female of the other, and the males with the apices of the elytra incised and bidentate, whereas in the other they are simple in both sexes. *P. stoutii* Lec. is also generally much larger and more robust, the smallest specimen that I have seen of this being 11 mm. in length. *P. granulatus* agrees with *P. megalops* Fall as regards the antennae, eyes, and color, but differs in being granulose over the entire upper surface, not with the elytra shining and punctate, and in having the front tibiae straight, not bowed, and incised at base.

Lesne, the latest authority to review the Bostrichidae, recognized two genera instead of the single genus *Polycaon*. *Polycaon* Cast. he defines[5] as having the body depressed, the anterior tibiae not excavated and bowed at base, the second and third tarsal joints not greatly enlarged apically, the propleurae convex, the elytra simple at apex and without carinae and tubercles. But two of our species, *P. stoutii* Lec. from California and Arizona and *P. punctatus* Lec. from Lower California, would be included. All of our other species would go into the resurrected genus *Heterarthron* Guer., characterized by having the body cylindrical, the anterior tibiae very robust, excavated and bent at the base, the third tarsal joints securiform, the propleurae flat or concave, the elytra often incised at the apex and bidentate or with carinae and tubercles on the declivity. *P. granulatus* agrees with *Polycaon* in having the anterior tibiae not excavated and bowed at base, the propleurae convex, and the elytra without carinae and tubercles on the declivity, and with *Heterarthron* in having the body cylindrical, the second and third tarsal joints securiform, and the elytra in the male incised and bidentate at the apex. It would thus link up the two; in other words, make unwise the retention of *Heterarthron* as a genus.

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[5] Lesne, P., "Révision des Coléoptères de la famille des Bostrichides." Anns. Soc. Ent. France, Vol. LXV (1896), p. 111.

Type male and allotype female, collected September 19, 1916, and March 8, 1916, and two male paratypes, collected September 3 and September 9, 1916, in my collection. They were captured at Carmel, Monterey County, California, by Mr. L. S. Slevin and kindly presented to me.

Dinoderus pubicollis n. sp.

> Cylindrical, moderately short, somewhat shining, piceous, antennae rufous and tarsi rufo-castaneous. Head with long fulvous hairs about mouth-parts and on basal joints of antennae, regularly rather closely and deeply punctate and strigose posteriorly; the antennae eleven-jointed, the first joint large, the second almost spherical and narrower and about one-half length of first, the first and second joints of club transverse, the last about as long as broad. Prothorax as broad as long, the anterior half with six concentric rows of sharp rasplike teeth, the individual teeth more or less united and more prominent in front, the area between the rows rather finely, closely and ocellately punctate and pilose, the hair fulvous and semi-erect, the posterior half distinctly and moderately, closely punctate with ocellate punctures, the punctures somewhat larger than in front and slightly asperate on disk, the sides with long fulvous hair, the lateral margin distinct and just reaching the end of the anterior row of rasps, the hind angles well rounded. Elytra slightly less than twice as long as prothorax and not quite twice as long as wide; coarsely, mod-

erately densely, regularly and ocellately punctured, the punctures larger than on pronotum and with slight tendency to form in rows near suture; the surface sparsely clothed with short erect fulvous setae, more numerous on declivity, the suture slightly elevated on declivity and with faint sulci on either side; the lateral margin at first obliquely curving away from the base, then horizontal at middle and again gradually and obliquely curved downwards to the apex. Beneath rather finely, sparsely punctate anteriorly, more finely and closely on the abdomen, subopaque, and pilose. Length 4 mm., breadth 1.5 mm.

The species differs from *D. brevis* Horn, the only other species from this country in the genus as it is now restricted by Lesne,[6] by being considerably larger, proportionally longer, with eleven-jointed antennae instead of ten, by having the lateral margin of the prothorax reaching the first row of rasps, the prothorax more distinctly pilose anteriorly and laterally, and by having the lateral margin of the elytra obliquely retreating from the base and forming an angle where it meets it, the sides of the elytra near the base therefore much narrower. Its only close relative is apparently *D. nitidus* Lesne, from the Marquis Is., a species which possesses also eleven-jointed antennae and has the lateral thoracic margin reaching the anterior rasps. It, however, differs from this by possessing an aural pilosity, ocellate punctures on both head and prothorax, and a distinct pubescence of the sides of the prothorax. It can not be the unrecognized *D. ocellaris* Steph. either, for the elytral punctures are not "disposed in striae" and the antennae piceous.

Type and nine paratypes in my collection, all collected by myself at Los Angeles, California. They were secured many years ago and, as I remember it, dug out of some mesquite cord wood stored in our cellar for fire wood. Just where the wood was cut, I could not say.

FAMILY CLERIDAE

Thanasimus undatulus Say (not *undulatus* Say).

Upon examining my series of this species and its associates, I have come to the conclusion that it ranges throughout a greater area than we formerly believed, and that it includes among its races, or subspecies, *T. monticolae* Wolcott and *T. rubriventris* Lec., as well as those usually given. Intermediate specimens show very distinctly that *T. monticolae* Wolcott grades into *T. undatulus* Say on one side and into *T. rubriventris* Lec. on the other. I would list them as follows:

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[6] Lesne, P., "Révision de la famille des Bostrichides, 2e Mémoire, Dinoderinae," Anns. Soc. Entom. France, Vol. LXVI (1897), p. 319.

T. undatulus Say, found from Alaska to eastern British Columbia and the Lake Superior Region.

T. undatulus var. *nubilus* Klug, found from Alaska to the Lake Superior Region.

T. undatulus var. *melanocephalus* Chev., found in Nova Scotia and New Hampshire.

T. undatulus var. *monticola* Wolcott, found throughout Western British Columbia and Washington and along the high Cascades and Sierra Nevada to Mt. Whitney.

T. undatulus var. *rubriventris* Lec., found from the northern California line down the coast as far as Monterey.

The species in all its varieties is mainly to be found on the true firs, *Abies;* true spruces, *Picea;* Douglas fir, *Pseudotsuga;* and possibly the hemlock, *Tsuga.* It is rarely found about the pines.

Phyllobaenus californicus n. sp.

Slender, parallel; black, posterior portion of first and intermediate antennal joints, basal areas of tibiae, and first tarsal joint of hind legs, somewhat rufous; moderately shining, with sparse, erect hairs and a silken white pubescence forming an indistinct design on the elytra. Head moderately, coarsely, densely, and shallowly punctured, eyes large but less projecting than in *P. dislocatus* Say and with a very deep triangular excavation on inner side (much larger and deeper than in *dislocatus*) that is clothed with white hair. Prothorax slightly broader than long, sides obtusely subangulate behind the middle, disc flattened, with two inconspicuous tubercles anteriorly, and similarly punctured to the head. Elytra as broad at base as prothorax, slightly wider posteriorly; disc somewhat flattened, with a semicircular depression at basal third, extending backwards from within the umbones, and two slightly oblique lateral depressions, one at the middle, the other posteriorly, an indistinct ridge bounding the median depression within, surface coarsely, deeply, and closely punctured, the punctures more or less regularly arranged in rows, the white pubescence chiefly evident along the suture, in the semicircular depression, on the oblique ridge between the median and posterior impression, and apically. Anterior tibiae acutely and irregularly serrulate on outer side. Body beneath sparsely and finely punctured, and sparsely hairy. Length 6.5 mm., breadth 2.5 mm.

This species is no doubt quite closely related to *P. merkeli* Horn, but it differs from that in lacking a yellow spot on the elytra, in having no distinct costa, and by the elytral punctures being fairly regularly arranged. This species, like *merkeli,* is quite unlike *dislocatus,* and, as stated by Dr. Horn, is strongly suggestive of the Mexican *Epiphloeus setulosus* Thoms. The genus *Epiphlocus* has, however, eleven joints to the antennae, whereas *Phyllobaenus* has but ten.

Type, a unique in my collection, captured in Yosemite Valley, California, May 18, 1921, by Miss Alice Riedy and by her kindly presented to me.

FAMILY CERAMBYCIDAE.

Semanotus cupressi n. sp.

Rufous, antennae, base of femora, tibia, and tarsi black, with much of the meso- and metasternal area darkened, and the elytra a deep blue; sparsely clothed with long erect hair. Head sparsely and finely punctured in front, closely and coarser behind; antennae at least two joints longer than body, all joints long and quite cylindrical, first joint large and coarsely, sparsely punctured, second joint twice as long as broad, third considerably longer than fourth, fourth slightly shorter than fifth, the last palpal joint dilated and almost squarely truncate at apex; eyes deeply emarginate. Prothorax slightly broader than long, with sides evenly rounded, slightly constricted at apex and oblique and vaguely sinuate towards base, the disc with median and two later somewhat semicircular callosities on basal half, elsewhere sparsely punctured, somewhat rugose at sides. The elytra slightly broader at base than prothorax, almost three times as long as broad, the sides straight and slightly tapering backwards, the apices conjointly rounded; the disc very coarsely, closely, irregularly, and cribrately punctured, a few very short and inconspicuous hairs clothing the surface in addition to the long ones. The prosternum distinctly separating the front coxae though neither broad nor triangular. The femora very decidedly clavate, the shanks narrow and long. Length 9 mm., breadth 2.5 mm.

In the female, the antennae reach but three-fourths the length of the body, the prothoracic callosities are less marked than in the male and the punctures finer and closer, the posternal process broader, and the legs uniformly rufous or with the tibia and tarsi somewhat dusky.

Type male and allotype female, in my collection, collected by myself from dying twigs of Sargent's Cypress, *Cupressus sargenti* Jepson, on Cypress Ridge, Marin County, California, April 6, 1921. I have also designated several other specimens as paratypes, one of which is to go to the U. S. National Museum, one to the California Academy of Sciences, and several to remain in my own and Mr. J. O. Martin Collections. A series of forty-three specimens has been examined, all taken at the same locality and on various dates in April and May. The species varies somewhat in size, the smallest seen being under 5 mm. in length and the largest fully 12 mm. It is a very attractive insect and in color and general appearance looks much like several of our species of *Phymatodes,* as *P. amoenus* Say and *P. blandus* Lec.

The genus *Semanotus* of Mulsant was established for certain relatives of *Hylotrupes* which differed primarily from that by having a narrower prosternum. The European *S. undatus* Linn. is, I believe, the genotype, and this I have carefully compared with our *nicolas* White,[7] of which *litigiosus* Casey is without doubt a synonym, and find no differences whatever more than of specific value. As regards the genus *Hylotrupes,* I agree with Col. Casey and most of the recent European authors that it should have all of the species excepting the type, *H. bajulus* Linn., removed from it, but I do not think that there was any need for establishing new genera like *Anocomis*[8] and *Hemicallidium* for their reception. The first, as I have shown above, I consider an absolute synonym of *Semanotus*. *H. amethystinus* Lec., the genotype of *Hemicallidium,* I have carefully compared with *Sympiezocera japonica* Bates and find that it has the same type of antennae, palpi, pro- and mesosternum, and other characters of generic value, and in fact, except for color, could hardly be separated. I would therefore place the genus *Hemicallidium* as a synonym of *Sympiezocera,* which latter is now placed according to the latest European catalogue, and I consider justly so, as but a subgenus of *Semanotus*. The following American species, *ligneum* Fab. and *nicolas* White (*litigiosus* Casey), I would consider as typical members of the genus, and *amethystinus* Lec. and *juniperi* Fisher as members of the subgenus *Sympiezocera*. My new species, *Semanotus cupressi*, does not belong with the more typical forms nor in the subgenus *Sympiezocera*, but in another group along with the Japanese *S. rufipennis* Mots., which differs primarily by having the terminal palpal joints truncate, the antennae quite delicate and the joints cylindrical, the prothorax quite evenly rounded on the sides, and the legs markedly clavate, as in *Hylotrupes bajulus* Linn., but differing from the last in having the elytra quite heavily and closely punctured. A new subgenus might be created, but it would seem best to wait for that until the time when the entire Holarctic Callidiini can be studied and revised.

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[7] Cat. Col. Br. Mu., VIII, p. 321.

[8] Memoirs of the Coleoptera, III (1912), by Thos. L. Casey, p. 271.

Semanotus nicolas White is widely distributed throughout the higher mountains of the west as well as the boreal regions of this continent and breeds in the true firs and perhaps also the true spruces. I have specimens in my collection from various parts of the Sierras, from Mt. Rainier, Washington, the Bitter Root Mountains of Montana, and from Rampart, Alaska. There is a great deal of variation both as regards size and color and to a certain degree as to punctuation. The males are generally all black, though I have specimens with the yellow fascia distinctly indicated. The females are as usual black with two yellow fasciae, though I have several Sierran as well as northern specimens that are entirely black and several that have the elytra in great part of an ochre color. I would consider *terminata* Casey as but a phase, an eastward extension of the boreal race. *S. ligneus* Fab. is, as Col. Casey has shown, very different from the preceding. It is widely distributed in this country and breeds only on the various species of cupressine[9] trees, cedars, cypresses, sequoias, and junipers, and breaks up into a number of races or subspecies, of which I would recognize three or at most four: the typical phase found in Eastern North America and reared from juniper; the var. *parvicollis* Casey from Colorado, probably but a weak phase of the preceding; the var. *ampla* Casey, a well-marked variety confined to the Pacific

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[9] I have here used the term cupressine in a broad way, referring to the order Toxodiaceae as well as the order Cupressaceae. Insects do not seem to separate these as do the botanists.

Coast and reared from various cupressine trees as *Libocedrus, Thuja, Cupressus,* and *Juniperus,* and very variable as to size and color; and a peculiar phase differing from the last in the fact that the males have the basal third of the elytra orange and the apical two-thirds a bluish black, the females not especially different from the more typical forms. This last variety might be called the variety *sequoiae* n. var., as it breeds exclusively in the coast redwood, *Sequoia sempervirens* Endl. The *S. angusta* Casey is but a weak phase of *ampla* Casey. I have a specimen from Seattle with a basal, a median, and an apical black bar that might prove to belong to a distinctive color race, but do not believe that it should be considered so until we see more material. *S. amethystinus* Lec. and *S. juniperi* Fisher are fairly constant except as regards size and as to a slight variation in the metallic shades of the elytra and breadth and outline of the prothorax in the former. The first breeds in *Libocedrus decurrens* Torr. and the latter in juniper. It is interesting to note in this connection that while *Hylotrupes bajulus* Linn. breeds in both pines and fir, all of the genus *Semanotus,* including the subgenus *Sympiezocera,* of which I have been able to get any records, live either in the firs or in some of the cupressine trees. Of the exotic forms, *Semanotus rufipennis* Mots. was reared by Lewis from fir rails, *Sympiezocera japonica* Bates found "running over decayed Cryptomerias,"[11] and *Sympiezocera laurasii* Lucas taken in the cedar forests of Algeria.[12] None seem to be found on pines. This is paralleled by the Buprestid genus *Trachykele,* the various species of which live either in fir or one of the cupressine trees.

Necydalis acutipennis n. sp.

> Robust, black, legs rufo-castaneous, elytra rufous, entire upper surface shining, the head and front and sides of prothorax sparsely clothed with a short black upright hair, entire thorax beneath and pleurae more densely covered with short and somewhat yellowish pile, the abdomen subopaque and with but a sparse clothing of minute hairs. Head with frontal longitudinal and fronto-clypeal grooves sharply impressed, the

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[10] Longicorn Coleoptera of Japan, by H. W. Bates, Anns. Nat. Hist., Vol. 12, 4 Ser. (1873), p. 198.

[11] Longicorn Beetles of Japan, by H. W. Bates, Journ. Linn. Soc., London, Zoo., Vol. 18 (1885), p. 227.

[12] Anns. Ent. Soc. Fr., 1851, Bull., p. CVII.

clypeus slightly reflexed anteriorly, the front densely punctured with moderate and fine punctures intermixed, the clypeus and vertex more coarsely and sparsely punctured, antennal tubercles prominent but without elevated crest; antennae reaching beyond middle of body, third joint one-third longer than fourth and slightly longer than fifth. Prothorax broader than long, 4 mm. x 3.5 mm., the sides strongly tuberculate at middle; the disc with median longitudinal and anterior and posterior impressions deep, the first laterally bounded by large elevated elliptical areas that are very finely and sparsely punctured, the apical and basal areas convex and more closely punctured. Elytra together broader than long, the sutural margin gradually arcuate from base to near apex where distinctly sinuate, the lateral margin also arcuate from base to apex but less curved at middle and meeting the suture at an acute angle at tip, the elytra therefore not truncate but acute behind, the disc very finely and sparsely punctured, with a well-marked longitudinal depression just without the suture and a second, shorter one, near the lateral margin, both posterior and not reaching the base, the apex distinctly angularly reflexed. Abdomen minutely, closely punctured. Legs robust, femora quite clavate, hind tibiae considerably dilated apically and but little curved. Length 22 mm., breadth 5 mm.

Type, a unique female in my collection, captured near Castle Crags, Shasta County, California, July 9, 1921, by Mr. C. L. Fox, and by him kindly presented to me.

The following table will enable it to be readily separated from the other known American species:

1. Elytra without transverse impression near apex and apex not reflexed ....3.
2. Elytra with transverse impression near apex and apex distinctly reflexed......................................5.
3. Large and robust species, 22 mm. in length, prothorax robust, with dorsal tubercles, and shining (Santa Barbara, Cal.). *barbarae* Rivers.
4. Smaller and delicate species, 15–20 mm. in length, prothorax elongate, subcylindrical, without evident dorsal tubercles and opaque (Eastern States)................*mellitus* Say.
5. Antennae long and delicate, upper surface quite smooth and shining, pronotum cylindrical and not sulcate above (Pacific States and Vanc.).......................*laevicollis* Lec.
6. Antennae robust, pronotum deeply longitudinally sulcate...7.

7. Entire body densely clothed with golden yellow pile, elytra truncate at apex (Cal.) .... *cavipennis* Lec.
   Upper surface quite smooth and shining, elytra acute at apex.............................. **acutipennis** n. sp.

This species can not be confused with any of our other species, for it is the only one with the apices of the elytra acute.

NEW SPECIES OF TENTHREDINIDAE FROM THE EAST AND MIDDLE WEST.[1]

By Alex. D. MacGillivray, Urbana, Ill.

The following new species were in collections received from Mr. F. M. Schott, Wyandanch, New York; Professor J. S. Hine, Ohio State University; and Professor A. L. Lovett, Oregon Agricultural College. They make an interesting addition to our fauna.

Acantholyda modesta n. sp.

Female. Body black with the clypeus, almost connected with two spots above antennae, a quadrangular spot on each frontal orbit, a wedge-shaped mark on each occipital furrow, the interocellar furrow, note-shaped mark from caudo-mesal angle of each compound eye to caudal margin of head, occipital orbits, extending to caudal margin and connecting with note-shaped marks and marks on occipital furrows, median area of mesonotum, mesoscutellum, small adjacent dash of each lateral lobe, metascutellum, margin of prothorax, tegulae, all the sterna, coxae, sterna of abdomen and margin on terga, more or less suffused with reddish, white; antennae with flagellum rufous, about thirty-five segments, first segment of flagellum longer than the next two; legs with femora black above and with a black line below, otherwise rufous; tibiae and tarsi rufous; wings hyaline, veins black. Length 15 mm.

Habitat: Wyandanch, Long Island, New York; F. M. Schott, collector. This species is similar to *marginiventris* Cresson.

Xyela intrabilis n. sp.

Male. Body black; the mandibles and the tegulae yellow; the clypeus, labrum, antennae, and legs dull luteous; head

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[1] Contributions from the Entomological Laboratories of the University of Illinois, No. 72.

polished, impunctate; antennal furrows obsolete; the labrum fringed with setae; the clypeus truncately rounded and very finely carinate at middle; median fovea wanting; front with a slender mesal furrow; antennae with the first segment of the flagellum longer than all the following segments together, the second and third and following segments of the flagellum subequal; lateral ocelli on slight protuberances, more elevated than median; mesothorax dull, impunctate; wings membranous, clear, stigma broad, not darkly colored, the radial sector interrupted for nearly half its length. Length 3 mm.

Habitat: Wyandanch, Long Island, New York; F. M. Schott, collector. This species falls near *salicis* Rohwer.

Empria columna n. sp.

Female. Body black with the knees and beyond rufous, paler on the anterior legs; clypeus uniformly convex, not carinate, deeply angularly emarginate; antennae with the first segment of the flagellum longer than the second, nearly as long as the subequal second and third together; antennal furrow broad, so broad as to appear almost wanting; ocellar basin a broad slightly concave area; median fovea a deep pit; ocellar and interocellar furrows wanting; saw-guides with dorsal and ventral margins converging, the ventral more strongly, the distal portion obliquely truncate; the wings smoky, the stigma, veins, and costa brown. Length 5.5 mm.

Habitat: Ira, Summit County, Ohio; received from Prof. Jas. S. Hine. This species, which runs to *cavata* MacG., is readily separated from this species by the form of the head and the shape of the saw-guides.

Pareophora guara n. sp.

Female. Body black with the collar, tegulae, knees, tibiae, and tarsi white; clypeus flat, shallowly roundly emarginate; antennae with the first segment of the flagellum distinctly longer than the second, the second and third subequal; lateral foveae large, nearly as large as the median fovea; ocellar basin not well defined; head scarcely depressed about the median ocellus; ocellar and interocellar furrows only faintly impressed; vertical furrows deep but very short; scutellum flat; pleura polished; saw-guides short, blunt, dorsal margin concave, the ventral and distal margins forming a continuous semicircle; wings hyaline, veins including costa and stigma pale. Length 6 mm.

Habitat: Marion County, Arkansas; received from A. L. Lovett. This species is very different from *floridana* Cresson.

Macrophya bellula n. sp.

Female. Body black with the labrum, clypeus, spot on each mandible, trochanters, protibiae above, the mesotibiae more or less above, more or less of the proximal portion of the protarsal and mesotarsal segments, and a spot on the upper side of the middle of the metatibiae; the antennae with the first segment of the flagellum distinctly longer than the second; the clypeus broadly roundly emarginate; the head and thorax finely punctured; the saw-guides with the dorsal margin concave, the ventral margin convex, the distal portion oblique, the distal end bluntly rounded; the wings hyaline, the stigma and the veins black. Length 8 mm.

Habitat: Greenwood Lake, New Jersey; F. M. Schott, collector. This species is related to *externa* Say.

Dolerus neoagcistus n. sp.

Female. Body black with the prothorax, the median lobe of the mesonotum, the greater part of each lateral lobe, the appendage of the scutellum, the mesopleura and metapleura for the most part, the basal plates, and the abdomen, except the saw-guides, rufous; the antennae with the first segment of the flagellum longer than the second, the second and third subequal; the head uniformly densely punctate; the vertical furrows punctiform; head not with a transverse furrow extending from the vertical furrows behind the compound eyes; the median and lateral lobes of the mesonotum uniformly finely punctate; the lateral lobes with an impunctate area extending to the median lobe; the mesoscutellum finely punctate; the appendage of the scutellum longitudinally striate; the saw-guides retracted, the distal end convexly oblique, sharply pointed above, setiferous; wings slightly smoky, the veins and stigma black. Length 8 mm.

Habitat: Southfield, New York; Frederic M. Schott, collector. This species is related to *agcistus* MacG.

Dolerus neostugnus n. sp.

Female. Body black with the prothorax, mesopleura, median lobe of the mesonotum, the metanotum except the metascutellum, the basal plates, and the abdomen except the saw-guides, rufous; the antennae with the first segment of the flagellum longer than the second, the second slightly longer than the third; the head with the front, frontal orbits, postocellar area, and vertical orbits uniformly punctate; the vertical furrows punctiform; the lobes of the mesonotum uniformly sparsely punctate, the caudal part of the lateral lobes and the mesoscutellum more closely punctate; the lateral lobes of the mesonotum not with a smooth area extending to the median lobe; the mesopleura closely punctate; the saw-guides with the dorsal margin slightly and the ventral margin strongly convergent, the distal portion obliquely truncately rounded; the wings hyaline, the veins black. Length 7 mm.

Habitat: Urbana, Illinois; received from A. L. Lovett. This species belongs to the *nudus* group; its coloraton will distinguish it.

Pristiphora luteola Norton.

This species, which was based upon the male alone, is the male of *Pristiphora bivittata* Norton.

ANOTHER REMINISCENCE OF EARLY DAYS.

By Wm. T. Bather, Past President, B. E. S.

Although I was not a charter member of the Brooklyn Society, I had the pleasure of meeting many of the early Brooklyn collectors.

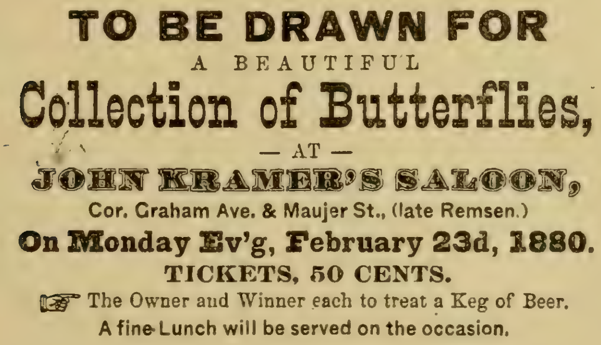
As a boy in the late seventies, I had never met an entomologist or any one interested in insects, but I often went in the fields and woods with a crude homemade net and corkless cigar box in which to pin my specimens.

One Sunday afternoon, I think it was in the year 1877, I was on the old Coney Island road, then a wonderful collecting locality with flowery fields, farms, and woodland from Prospect Park to the Coney Island creek; a single-track horse-car line was the only means of transportation, and the greater part of a day's outing was consumed in a trip to and from the now famous Coney resort.

I saw across the fields for the first time in my life a man with a butterfly net, and I lost no time in introducing myself to none other than our good member, Mr. Jacob Doll. He invited me to his home and gave me my first lesson in the art of collecting, mounting, and preserving insects. He also gave me a big female Cecropia moth, a great prize at that time. It was through his kind interest that I became a collector, and I am indebted to him for many happy hours spent in the fields and woods.

I then met Mr. John Ackhurst, a conspicuous individual, with long wavy hair—a dealer in butterflies and biological material. I collected insects and cocoons for him for a year or two.

In the year 1880, I bought the ticket here reproduced for a chance on a collection of butterflies to be drawn for at John Kramer's saloon in old Williamsburg. I forget who won the collection, or what became of it—perhaps it faded away in some merchant's show window or was reduced to dust by Dermestidae—but the event was an orderly jolly gathering of entomological enthusiasts who discussed collecting experiences and drank vast quantities of wholesome lager beer.



TO BE DRAWN FOR
A BEAUTIFUL
Collection of Butterflies,
— AT —
JOHN KRAMER'S SALOON,
Cor. Graham Ave. & Maujer St., (late Remsen.)
On Monday Ev'g, February 23d, 1880.
TICKETS, 50 CENTS.
☞ The Owner and Winner each to treat a Keg of Beer.
A fine Lunch will be served on the occasion.

The collection has vanished, and but few of the men at that pleasant gathering are now alive, but this card has been treasured and remains to-day a silent reminder of HAPPY DAYS, before reformers and the Eighteenth Commandment took the joy out of life.

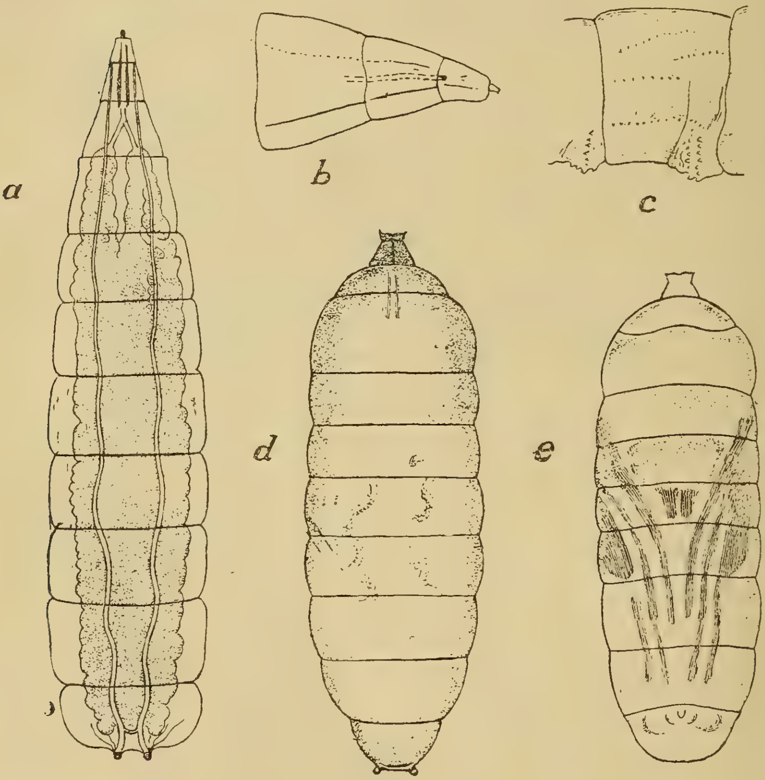
The Index for Volume XVII (1922) was mailed to subscribers with the number for February, 1923 (Vol. XVIII, No. 1). Subscribers should assure themselves they received it.

THE LARVAL STAGES OF LIMNOPHORA DISCRETA STEIN (DIPTERA, ANTHOMYIDAE).

By Werner Marchand, Ph.D.[1]

On October 31, 1918, while sifting for tabanid larvae at the White City Park pond of Trenton, New Jersey, the writer found a small whitish dipterous larva, unknown to him and of a type not figured in Malloch's paper. It may be briefly described as follows:

Description of Larva (Fig. 1, *a–c*).



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[1] From the Department of Animal Pathology of the Rockefeller Institute for Medical Research, Princeton, N. J. The author resigned April, 1919. The publication of these notes was delayed as at the time I was unable to have the imago identified.

Fig. 1. Larval stages of *Limnophora discreta* Stein. (*a*), dorsal view of larva; (*b*), lateral view of first three segments of larva; (*c*), lateral view of one of the abdominal segments of the larva; (*d*), dorsal view of puparium; (*e*), ventral view of puparium, with imago developing within.

Measurements: 9 mm. long, 1½ mm. diameter. Color creamy white. Intestinal contents orange in color. Chitinous head-skeleton and the two respiratory tubercles at the posterior end dark brown. Body shape cylindrical, pointed anteriorly, rounded posteriorly. The posterior segments hardly decreasing in diameter towards the posterior end. The four anterior segments narrower, the first (prothoracic) segment very small. Twelfth segment fused with the eleventh and not clearly distinguishable. Owing to this fact and to the smallness of the first segment the larva may appear 10-segmented at first sight. Anterior segment in constant, active movement. Chitinous rods of mandibles nearly straight, dark brown, reaching to posterior border of second segment. Fat-body strongly developed, white, reaching from the eleventh into the third segment on both sides, completely enveloping the salivary glands and the intestine, but leaving the tracheae free on the dorsal side. Ventrally the fat-body envelops everything; in the middle of the body the orange color of the intestine is visible. Ducts of the salivary glands free, slender, uniting anteriorly near the posterior end of the chitinous rods. Malpighian vessels partly extending into segments six and seven, brownish anteriorly, whitish posteriorly. Cephalic ganglion large, brownish; ganglion chain highly concentrated; its total length only that of the cephalic ganglion. Tracheal trunks slender, of even length throughout, only gradually narrowing down anteriorly; describing broad and indistinct loops. Commissures not noticeable; if present on dorsal side, they must be very long as not to hinder the sidewise shifting of the tracheal trunks. Commissures posteriorly of pharynx very distinct; a second commissure in segment eleven likewise distinct, rather short and straight, holding the tracheae here fixed at a certain distance. Laterally very slender tracheal branches given off obliquely on each side. Anteriorly, the tracheal trunks end at the anterior border of the second segment, laterally on each side in a (rudimentary ?) anterior spiracle, similar to that found in *Chrysops* before pupation. Posteriorly, the tracheal trunks open separately in two short, cylindrical, brownish-black respiratory prominences, which are about three times their own diameter apart from one another.

> Three more slender tracheae endling likewise in each of these tubercles.
>
> Integument silky shining, with extremely fine, microscopical, parallel striation, which is more distinct on segments ten and eleven than in the anterior part of the body, where the integument is dull in appearance. The place of prolegs is taken by a transverse ventral swelling on each of the segments four to ten; each swelling armed with two rows of short, roundish spines or hooks. Areas of the integument fairly well demarcated on abdominal segments. Ventral areas as wide as the transverse swellings, on both sides of the latter demarcated from the lateral areas by a longitudinal row of about fifteen punctiform depressions. Lateral areas indistinctly differentiated into upper, middle and lower lateral areas by means of rows of punctiform depressions. Row of punctures separating middle and lower lateral area consisting of about seven punctures, beginning at posterior end of segment but not reaching anterior border. Row of depressions between middle and upper lateral area likewise consisting of five to seven punctures, beginning at anterior border of the segment but not reaching the posterior border. Row of depressions separating dorsal and lateral areas longer, comprising about eight to twelve punctures, beginning at posterior border of segment but not quite reaching the anterior border. All areas very finely and minutely striated. On segments four to ten the three lateral areas are thus demarcated. On the meso- and metathorax the lateral areas are undivided. Owing to the smallness of the prothoracic segment its structure could not be determined. On the meso- and metathorax the lower border of the lateral areas has more the character of a straight furrow; the upper border of a row of punctiform depressions homologous. No Graber's organ (of Tabanidae) could be seen in this larva.

On November 9 a second specimen of this larva was found in the same locality. This specimen did not differ from the one described except that the Malpighian vessels were better visible and wholly white, extending dorsally through the greater part of the body, and that the salivary glands were better visible, being of much greater diameter than the Malpighian vessels, but more grayish-transparent and partly enveloped in the fat-body. The intestinal contents were bright orange. This specimen remained orange in color, while the first-taken specimen was more of a lemon yellow. The two larvae were kept in test-tubes lined with moist filter paper; as food, boiled meat was given, but it could not be ascertained whether any food was taken. The larvae were observed daily; they moved freely about in the test-tubes, being found at times near the bottom, at other times near the upper end, resting sometimes with head pointing downward, at other times pointing upward, while no preference for a particular resting attitude could be detected.

On November 20 both specimens had pupated, one of them undoubtedly on the same day, since it was still pale in color, the second specimen either early on the same day or on the preceding day. Pupation takes place within the larval skin, the result being a puparium. No cocoon is formed.

Description of Puparium (Fig. 1, *d–e*).

Length 5 mm., diameter 1½ mm. Color yellowish-fuscous, at first pale, then darker reddish. In the fresh pupa dark mouth-parts and pale Malpighian vessels shining through the integument, the passive movements of the latter plainly visible. Integument of mature puparium not transparent; surface generally reticulate in structure. Body twelve-segmented; segment one short, consisting of two roundish swellings at the anterior extremity of the body, bearing the two small, whitish cylindrical anterior spiracles. Segment two narrow, wider posteriorly, at base only one-half as wide as segment three, brown, rugose, with a dorsal, ventral and lateral ridge, the latter continued upon the third segment. Third segment with posterior border twice as wide as anterior, broadly convex, evenly rounded; surface with fine chitinous ridges in a reticulate arrangement. Fourth segment of still greater diameter, rounded, areolate. Border between the segments rugose, with areolae smaller and less distinct. Following (fifth) segment not wider than fourth; surface areolate; following six abdominal segments at first wider than preceding, posterior ones gradually narrower; sixth of these segments (eighth abdominal = eleventh body segment) about one-half as wide as first (third abdominal). Last or twelfth body segment small, short, flat, placed somewhat ventrally, distinctly separate from eleventh segment, with two divergent black spiracular processes. Spiracular processes short-cylindrical, rounded at tip, compressed laterally; placed at a distance of about three times their own diameter from one another. All abdominal segments except twelfth distinctly areolated; border lines of segments with areolae indistinct or reduced to wrinkles. Borders of segments slightly constricted. Ventral side more evenly rounded, surface areolated like dorsal. A pale rounded spot

> ventrolaterally at posterior border of segment four. A median ridge ventrally of segment two. Lateral ridge on segment two continued on segment three and disappearing in the areolated surface structure of segment four. Areolate structure of integument of a polyhedral character on thorax; reticulae (meshes) more flattened out transversely on abdomen, especially on dorsal side.

The two puparia were placed in a Petri dish containing algae and some moist filter paper and covered with a glass slide. On Nevember 29 both puparia had assumed a darker color, wings, legs, and mouth-parts becoming visible through the integument. The first imago hatched November 30; the second was found hatched on December 2, and it had probably emerged the day before. These two flies have been kindly identified by Mr. J. R. Malloch as belonging to *Limnophora discreta* Stein, a species of which the life-history was thus far unknown.

ORTHOCEPHALUS MUTABILIS FALL. (HEMIP., MIRIDAE).

By J. R. Stear, Penna. Bur. of Plant Industry, Harrisburg, Pa.

Numerous specimens of this species, including nymphs in all stages as well as adults, were collected at Orono, Maine, by Mr. and Mrs. Robt. J. Sim, on June 15, 1922. They were determined for me by Prof. H. H. Knight, of the University of Minnesota.

They were taken on ox-eye daisy (*Chrysanthemum leucanthemum*), which was noticeably injured by the feeding of the Mirid, the plants being undersized and poorly developed. In an adjoining field not infested the daisies were normal in size.

It is interesting to note that *O. mutabilis* is an European species, where it has been known for over a hundred years. The only other reference to this species in American literature is that by Knight, in Can. Ent., Vol. 49, p. 249, who states that specimens were taken July 2, 1913, by C. W. Woods at Orono, Me. Mr. Woods found them on "wild daisy" and in only one field.

ALTICA OR HALTICA?

By William Colcord Woods, Wesleyan University.

When we examine the 1758 (10th) edition of Linnaeus's Systema Naturae, we find most of the leaf beetles included in the single genus *Chrysomela,* which corresponds quite closely to what we recognize to-day as the family Chrysomelidae. The first step toward splitting up this complex was made a few years later, in 1762, when Geoffroy, a French entomologist, erected a new genus for those species of *Chrysomela* in which the hind thighs are thickened for leaping—that is, for the flea-beetles, designating them as *Altica* (Hist. nat. des insectes . . . t. 1 : 244). This generic name, based on the Greek adjective ἅλτικος, skilled in leaping, was emended to *Haltica* by Illiger, because of its Greek derivation, in 1802 (Mag. f. Insektenk. Bd. 1 : 138). In 1917 the writer advanced the opinion that Geoffroy's spelling should stand despite his omission of the aspirate (Me. Agr. Exp. Sta. Bul. 265, p. 274, *et seq.*), but since *Haltica* is retained as the preferred spelling in Leng's recent list of the Coleoptera, it seems advisable to review the evidence.

Article 19 of the International Code: "The original orthography of a name is to be preserved, unless an error of transcription, a *lapsus calami,* or a typographical error is evident" seems to be the only rule bearing directly on the question of emendations. *Altica* Geoffroy is not a *lapsus calami,* since Geoffroy customarily omitted the "h" in transliterating from Greek, nor is it a typographical error. Is it an error of transcription in the sense of the Code?

Before any specific case is settled there should be some consideration of the general principles involved, for if the emendation to *Altica* be admitted, consistency demands that the missing aspirate be supplied in all similar cases. In the Coleoptera alone, no less than 85 generic names in addition to *Altica* must be similarly changed if we are to insist rigidly on an exact transliteration from the original Greek, for most French scientists and apparently some of the earlier English zoölogists deliberately disregarded the breathing in forming words from Greek roots. How, therefore, can we expect a stable nomenclature except by recognizing priority and accepting each name in the form in which it was first proposed? That our present American usage is chaotic rather than scientific—still confining our attention to the Coleoptera—any one fairly familiar with Greek can discover for himself by running through the index of genera in Leng's recent list of the Coleoptera, a most careful and painstaking work deservedly recognized as the standard catalogue of North American beetles. Below, though by no means complete, is a list of generic names occurring in this work, all of which are derived from Greek words beginning with a rough breathing, and were originally proposed without the aspirate. In the first column is given the original orthography, in the second the correct transliteration according to present American ideas, and in the third the form in which the name appears in the Leng catalogue.

Original orthography.	Correct transliteration.	Form in Leng's Catalogue.
Abraeus	Habraeus	Abraeus
Altica	Haltica	Haltica (Altica)
Aploderus	Haploderus	Aploderus (Haploderus)
Elodes	Helodes	Helodes (Elodes)
Elosoma	Helosoma	Elosoma
Omala	Homala	Omala
Omalisus	Homalisus	Omalisus
Omalium	Homalium	Omalium (Homalium)
Omalodes	Homalodes	Omalodes
Omophron	Homophron	Omophron
Ormiscus	Hormiscus	Ormiscus (Hormiscus)

Of these eleven generic names proposed originally without the "h," in two, *Haltica* and *Helodes,* the emendment is admitted; in three, *Aploderus, Omalium,* and *Ormiscus,* it is rejected; and the remaining six are left in their original form. From the standpoint of the *Altica-Haltica* controversy, it is interesting to note that *Homalisus* does not appear at all in the List, because Geoffroy proposed *Omalisus* as well as *Altica,* and Illiger emended the former to *Homalisus* just as he did the latter to *Haltica,* so that the status of the two names is exactly the same. It seems evident that we should accept consistently the original orthography in all cases, or else employ all these names only in an emended form; the first alternative alone commends itself to the writer's judgment.

Passing now to the specific case of *Altica* vs. *Haltica,* the arguments in favor of the older name may be summarized as follows: (1) Article 19, strictly interpreted, does not deal with transliteration; (2) *Altica* is a transliteration found in classical Latin; (3) Geoffroy in this transliteration merely followed contemporary French usage; and (4) the Latin language, the language of scientific nomenclature, has never been strict in the use of the aspirate. Except for (2) these arguments are equally valid for cases similar to that of *Altica.*

(1) *Altica* as a Latinized form of the Greek ἅλτικος is at worst an error, not of transcription, but of transliteration. Article 19 of the Code makes no statement about transliteration, but as it seems evident from the context that "transcription" is used in the sense of "transliteration," the writer does not wish to rest on this technicality, believing that wisely or unwisely in intent if not in wording the Code admits the possibility of emendations.

(2) Although there is no definite statement in the *Histoire,* the writer does not doubt that Geoffroy Latinized *Altica* directly, without regard to classical usage, yet it is relevant to point out precedents for such a transliteration. Alticus, a Roman cognomen well known from inscriptions, is doubtless derived from the Greek ἅλτικος (White and Riddle, Latin Dictionary), while in Homeric Greek the second aorist of the related verb ἅλλομαι occurs regularly with the smooth breathing instead of the rough. The writer does not believe that either of these cases influenced Geoffroy, but they do show that emendation is unnecessary in this particular case.

(3) But the crux of the situation lies in the fact that Geoffroy simply followed the best French usage in omitting the aspirate when transliterating from Greek. Under these circumstances no fair charge of "error of transcription" can be alleged, for the Code obviously refers, not to a widespread linguistic custom, but only to individual errors.

To avoid unnecessary detail, only the work of Commerson, Geoffroy's exact contemporary, is cited. Commerson, at the request of Linnaeus, wrote a treatise on the fishes of the Mediterranean, in which the "blennie sauteur" is described as *Alticus,* with the common name "altique." This paper, though never published, was completed about 1755; it has, of course, no zoölogical status, and *Alticus* was never subsequently proposed as a generic name.*

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* *Halticus,* however, was proposed by Hahn in 1831 and is a valid genus of hemipterous insects of the family Miridae.

but it does show the prevailing usage. As has been stated, Geoffroy proposed *Altica* in 1762, vulgarizing the name as "altise." Both "altique" and "altise" appear in the *Grand Dictionnaire* of Pierre Larousse, the standard French dictionary. Under both words the derivation is given as "du gr. altikos, sauteur," the aspirate being omitted, and the word written in Latin, not Greek, characters. The volume containing the "a's" was published in 1866; the second supplementary volume, published without imprint about 1890, refers back to this volume for the derivation of "altise." Since, judging from French and Italian dictionaries, a disregard of the aspirate in transliterating from Greek is the recognized usage of those languages, there can be no reasonable doubt that the "h" was deliberately omitted by many of the earlier zoölogists in forming generic names based on Greek roots, and that Geoffroy in forming *Altica* and *Omalisus* intentionally left out the "h." It would seem perfectly clear that *Altica* Geoffroy, by no means an "evident error of transcription" in the sense of the International Code, should be retained, *Haltica* Illiger being listed as a synonym.

Certainly *Haltica* should at all events be referred to Illiger, 1802, and not Geoffroy, 1762, as is commonly done. Article 21 of the Code states that the citation of the author's name is to denote responsibility and to aid in bibliographic research, not to "give credit." It does not make any easier what is at best a tangle to refer to Geoffroy a name which did not appear in his Histoire and which was not proposed until fifty years later. In discussing a somewhat similar case, Article 3 says: "In following this plan we are not attempting to rob Redon of any supposed credit which belongs to him, but we do not hold him responsible for names introduced by later authors."

If *Altica* be retained, of course the tribe Halticini will become Alticini, and the subfamily Halticidae, Alticidae.

(4) Two illustrations out of many possible ones will suffice to show the deviations of Latin usage as regard the "h." The best Latin, as well as the Sanskrit derivation, demands that "harena," a sandy place, be spelled with an "h," but the incorrect spelling, "arena," came into commoner use and has persisted. On the other hand, while the Latin word for shoulder, being related to the Greek ᾦμος, should be written "umerus" and not "humerus," the incorrect spelling, "humerus," has passed into scientific use. Until we are prepared to change "arenarius" wherever it occurs as a

specific name to "harenarius," and to treat of the "umerus" instead of the "humerus" in our textbooks of anatomy, we can not, with any consistency, admit Illiger's emendation of *Altica*.

The writer is one of those entomologists who does hope that ultimately we may recover a stable nomenclature, and for that reason he still finds himself in cordial agreement with the opinion which Allard expressed so many years ago. "It seems to me," he wrote in discussing the *Altica-Haltica* problem, "that the orthography of the word should be determined by priority, and since Geoffroy in 1762 and Fourcroy in 1785 wrote it with an 'a,' with Latreille we must respect their right of invention and omit the 'h'" (Ann. Soc. Ent. Fr., 1860, ser. 3, t. 8: 41).

OBSERVATIONS ON THE OCHTERIDAE.

By Prof. R. Takahashi.

[English Résumé by the author of the original Japanese in Trans. Nat. Hist. Soc. Formosa, Vol. XI, No. 55, pp. 119–125 (1921).]

Very little has been published relative to the habits of the family Ochteridae and the writer made these observations on *Ochterus formosanus* Mats., which is not uncommon in Formosa:

(1) The adults live upon the sandy shores of ponds or streams, where the color of the backs merges into their surroundings, rendering them difficult to discern. They are not able to submerge, and do not run out upon the water, where they are sometimes found by accident, but the nymphs are amphibious, being often seen submerged.

(2) The adults are very active, although the nymphs are rather inactive. The death-feigning habit has never been observed.

(3) The species is not gregarious, but two or three nymphs are sometimes found in groups.

(4) The nymphs sometimes vibrate their abdomens vertically a little for a few seconds when resting on the shores.

(5) The nymphs cover their backs completely with sandy granules. All the instars have this habit. Their heads are provided, on the front, with 12–14 short, stout processes, projecting forward and arranged in a transverse row, with which they scoop the sand upon their heads and push it backward with the front legs.

(6) The nymphs construct for themselves small cells of sand above the ground, employing frontal processes, in which the molts take place.

(7) The nymphs, with wettable dorsum, are amphibious in habit, being often found submerged. When submerged, the bodies are always held just below the surface film, and they swim rather awkwardly, moving all the legs, but do not swim deeper. A store of air for respiration when submerged is carried below by the insect on the under surface of the abdomen; and the nymphs now and then lie back down, exposing the lower surface of the abdomens into free air to take in a new supply of air. This act is very quickly done.

(8) The mating habit is almost as in *Microvelia,* but the males do not remain on their mates for a long time when copulation is finished.

(9) The eggs are placed singly upon the sandy granules, or upon the decayed leaves on the shores.

(10) The egg is similar in structure to that of *Gelastocoris* figured by Dr. Hungerford (1919), measuring about 0.7 mm. in length.

(11) There are five nymphal instars, as is common for many Heteroptera, and the nymphal stages last more than one month.

(12) In the adults, the front and middle tarsi are 2-jointed and the hind 3-jointed, while in the nymphs all the tarsi are always 2-jointed.

(13) The adults may be seen at any season throughout the year in Formosa.

PROCEEDINGS OF THE SOCIETY.

Meeting of January 12, 1922.—The election of officers was postponed till the next meeting.

Long Island Records.—Mr. Doll showed a specimen of *Schistocerca vaga* Scudder (named by Mr. W. T. Davis), taken by him in a store at Brooklyn, January 6; the species is indigenous in the southwestern United States.

Scientific Programme.—Mr. J. R. de la Torre-Bueno read a paper "*On Some Rare New York Heteroptera.*" Mr. Howard Notman presented some "*Remarks on Stenus* (*Staphylinidae*)." Mr. A. Weeks spoke of "*Damage by Unwise Drainage of Swamps to the Indigenous Fauna and Flora.*"

Meeting of February 16, 1922.—Mr. Engelhardt announced the death, on February 15, of Mr. Ed. L. Graef, Honorary President of the Society. (An obituary notice, with portrait, appeared in the Bulletin for April, 1922.)

The following officers were elected to serve during the year 1922: President, Mr. W. T. Davis; Vice-President, Mr. J. R. de la Torre-Bueno; Corresponding and Recording Secretary, Dr. J. Bequaert; Treasurer, Mr. G. P. Engelhardt; Librarian, Mr. A. C. Weeks; Curator, Mr. G. Franck. The Publication Committee to consist of Mr. J. R. de la Torre-Bueno, Editor; Mr. G. P. Engelhardt; and Dr. J. Bequaert. Mr. Howard Notman was appointed Delegate to the Council of the New York Academy of Sciences.

Long Island Records.—Mr. Engelhardt showed specimens of the European bee, *Megachile centuncularis* (Linnaeus), taken in a house at Brooklyn. They had issued from a nest located in a shell-case imported from Europe.

Scientific Programme.—Mr. W. T. Davis spoke at length of "*The Grasshoppers of the Genus Schistocerca in North America.*" He pointed out that of the ten species known from the United States, two occur on Long Island, one more being found in New Jersey. *S. alutacea* Harris and its var. *rubiginosa* Harris breed on Long Island. The large *S. americana* Drury is found near New York City in the summer, but does not breed farther north than Maryland and Washington, D. C. Mr. A. C. Weeks read a paper on "*Present Wasteful, Injurious, and Inadequate Methods for the Extermination of the Mosquitoes.*"

Meeting of March 16, 1922.—Mr. Notman was elected Corresponding Secretary to complete the number of seven members of the Executive Committee provided for by the By-Laws. Mr. C. Schaeffer was appointed Recording Secretary *pro tem.* until Dr. Bequaert's return from Europe.

Local Records.—Mr. Doll showed *Coryphista meadii* (Packard), collected at light by Mr. Witte, at Irvington, New Jersey, August 12, 1921. This species was never before recorded from the eastern United States.

Scientific Programme.—"Collecting Experiences on Long Island." Messrs. McDevitt, Engelhardt, Doll, Weeks, and Bueno successively spoke on this subject. Mr. W. T. Davis exhibited a box of insects collected at Tampa, Florida, in the spring of 1921, by Mr. E. L. Bell. Among them were five nymphs of the large lubber grasshopper, *Romalea microptera* P. de Beauvois, collected March 3. He also exhibited adults of this species collected at Hope and Gum Springs, Arkansas, in June, July, and August, and two females and a male from Orange, Texas, taken in August, 1914, stating that these localities seemed to extend the known range of the species. The Arkansas specimens were of the black form *marci*, while those from Texas were intermediate in color between *marci* and the typical yellowish *microptera* of Florida. Other specimens shown were from Mississippi, where *marci* and intermediates between it and *microptera* occur.

MEETING OF APRIL 13, 1922.—**Local Records.**—Mr. Schaeffer reported the capture of several specimens of *Myas foveatus* Leconte, at Huntington, Long Island, by Mr. F. M. Schott. Mr. Davis said he had taken a specimen of *Carabus nemoralis* Müller in his garden on Staten Island.

Scientific Programme.—Mr. Bell spoke at length of his *"Collecting Experiences on Long Island in 1921."* From May 8 to September 10 twenty-nine trips were made in the territory lying between Flushing and Jamaica on the west, Port Jefferson and Patchogue on the east, and the north and south shores of the Island. The total number of butterflies taken was 50 species and one form. He took a single male of *Atrytonopsis hianna* (Scudder) at Central Park, L. I., May 29, on the flowers of a red clover. *Pamphila leonardus* Harris was again taken at Coram, the only locality on Long Island where this skipper has been found thus far. Mr. Good, of Cornell University; Mr. Hatch, of Syracuse University; and Mr. Sherman, of New York University, presented some remarks upon their own entomological studies.

MEETING OF MAY 12, 1922.—**Local Records.**—Mr. Doll showed a specimen of *Phyciodes nycteis* Doubleday & Hewitson, collected by Mr. Kassir, at Woodhaven, L. I., June 7; this is the first record of the species for Long Island. Mr. Schaeffer exhibited a specimen of *Anomala orientalis* ———, a Japanese beetle, sent to him for identification by Dr. Britton, of the Agricultural Experiment Station at New Haven, Conn. Four specimens of it were taken alive by one of his field agents. This beetle is recorded as very injurious in the sugar plantations of Hawaii.

Scientific Programme.—Mr. de la Torre-Bueno presented *"Some Remarks on Aquatic Hemiptera from Ceylon."*

MEETING OF JUNE 15, 1922.—**Local Records.**—Mr. Davis read some interesting notes on old-time entomology on Staten Island, from an old book of Records of Norefield, Staten Island, labeled "Town Records 1783 to 1823." He also mentioned the possible abundance of the Milkweed Butterfly this season. Mr. Bell said that *Thecla damon* Cramer occurred plentifully on the blossoms of the beach plum this season.

Scientific Programme.—Mr. Engelhardt addressed the Society on his *"Collecting Experiences and Observations on a Visit to Alabama, Mississippi, and Florida,"* in late April and early May. Among the insects exhibited were a fine series of the southern maple borer, *Synanthedon tepperi* (H. Edwards), collected at Mobile, Ala., and of *Enodia portlandia* (Fabricius), from Alabama and Florida; the latter differ from the northern form of the species by their larger size and much heavier maculation, though all lack the suffusion on primaries of the southern form known as *Enodia creola* Skinner. *Catocalae* of a number of species were quite common in the so-called "hammocks" at Gainesville, Fla., but difficult to capture on account of their wariness among the dense vegetation.

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Vol. XVIII JUNE, 1923 No. 3

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

Smithsonian Institution
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PUBLICATION COMMITTEE
J. R. de la TORRE-BUENO,
Editor
DR. J. BEQUAERT GEO. P. ENGELHARDT

Published by the Society

Price, 35 cents Subscription, $1.50 per year

Mailed July 12, 1923

Entered as second-class matter January 21, 1919, at the postoffice at Lancaster, Pa.,
under the Act of March 3, 1879

The Brooklyn Entomological Society

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CONTENTS

VESTIGIAL PLEOMETROSIS IN POLISTES PALLIPES, Bequaert 73
SYNONYMY IN CETEMA, Aldrich 80
TWO NEW SPECIES OF CANTACADERIA, Drake 81
EVERGESTIS STRAMINALIS, Chittenden 84
NOTICE TO SUBSCRIBERS 84
TERMINAL ABDOMINAL STRUCTURES OF FEMALE MASTOTERMES DARWINENSIS COMPARED TO PERIPLANETA AMERICANA, Crampton 85
AMBLYSCIRTES VIALIS—A CORRECTION, Bell 93
TRICHOTHRIPS ULMI IN N. J., Weiss and Lott 94
NEW LONGICORN BEETLE FROM THE CATSKILL MTS., Davis 97
RECENT PUBLICATIONS IN TROPICAL ENTOMOLOGY, Bequaert 99
A NEW N. AM. NOTONECTA, Bueno and Hussey 104
EXCHANGES 108

Bulletin of the Brooklyn Entomological Society

Published in

February, April, June, October and December of each year

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BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XVIII July, 1923 No. 3

VESTIGIAL PLEOMETROSIS IN THE NORTH AMERICAN POLISTES PALLIPES LEPELETIER.

By J. Bequaert, New York, N. Y.

In the October-December, 1919, issue of this Bulletin my esteemed friend, Mr. Wm. T. Davis, has published some observations of the common American social wasps, a most welcome addition to the scanty literature of the subject in America. Among other interesting points, he relates several cases in which two, three, or four queens of the common Eastern *Polistes pallipes* Lepeletier (= *metrica* Say; *variatus* Say) had worked together in establishing a new colony, though in this as in other species of *Polistes* each queen as a rule starts her nest alone.

The founding of a new colony among social Hymenoptera by two or more fecundated females is nowadays usually called "pleometrosis," following Wasmann's terminology. When it occurs among strictly monogynous wasps, as with *Polistes,* it is well worthy of careful investigation, since it evidently is then one of those vestigial instincts whose study is of great value for a proper understanding of the evolution of animal behavior (Wheeler, 1908).

During the spring and summer of 1918, Mr. John Treadwell Nichols, Curator of Ichthyology at the American Museum of Natural History, observed the nesting habits of *Polistes pallipes,* and he has very kindly communicated his notes to me for publication. The several nests found by him and described below were all located under boards in a grassy field at Mastic, Long Island, N. Y.

1. A first group of three *Polistes* nests was found on May 12 under one of the boards. The weather being foggy and cold, the

mother wasps were clinging around the pedicel of their respective nests and could be captured without difficulty. All three nests had been recently started. The first was about 8 mm. in diameter and consisted of five cells of the usual width, but only about 5 mm. high, each containing an egg placed vertically in the bottom; it was attended by *one* female. The second, also occupied by *one* female wasp, measured about 11 mm. in diameter, consisting of seven cells not over 6 mm. high and each with an egg. The third nest, however, was considerably larger than its neighbors, reaching 14 mm. in diameter, with eleven cells, each with its egg, the central cell 8 mm. high; *two* queen wasps were found on this nest, which fact probably accounts for the larger size of the structure.

2. Another group of four *Polistes* nests was discovered under another board in the same field on May 19. At my suggestion, these nests were left with their inhabitants, their condition being noted from time to time by Mr. Nichols, with a view of ascertaining whether the presence of more than one queen is really of some advantage to the progress of the community. The history of each of these four nests is as follows:

Nest (*a*) consisted on May 19 of ten cells and was occupied by *two* queens, each cell containing an egg. On May 27, fourteen cells. On June 8, seventeen cells, some with rather large larvae. On June 22, nineteen cells, one of them closed above the full-grown larva. On June 29 the nest was in much the same condition, but it had fallen to the ground and only one of the queens was present. It was not observed after that date.

Nest (*b*) on May 19 of eight cells, attended by *one* female. On May 27, eleven cells with eggs or very small larvae, and a twelfth cell just started. This nest was not further observed.

Nest (*c*) on May 19 of seventeen cells, with *two* females. On May 27, nineteen cells. On June 22, nineteen cells with eggs or very young larvae, the two queens still present. On June 29, twenty cells with larvae, two queens. On July 16, some of the cells were sealed above full-grown larvae; two queens present. On August 19, many of the cells were sealed up and, in addition to the two mother wasps, five newly hatched workers were present. This nest was taken home at that date and a number of males were bred from it at the end of August.

Nest (*d*) on May 19 of eight or nine cells, with *one* female. On May 27, fourteen cells. On June 8, nineteen cells, some with rather large larvae. On June 22, twenty-one cells, two in the center being closed with a cap and one of them empty; a newly hatched worker was found on the nest together with the queen. On June 29 the nest was in much the same condition and it was not observed after that date.

The advantages gained by the presence of two mother wasps in one colony are not very striking in these cases, but the observations are too fragmentary to warrant any conclusion. It would be extremely interesting to have such experiments repeated on a much larger number of colonies and over several successive years, so as to eliminate the possible influence of seasonal conditions. At any rate, Mr. Nichols' observations tend to show that pleometrosis must be of rather common occurrence with *Polistes pallipes*. Yet this way of starting a new colony has been but rarely mentioned in this species, perhaps because most observers did not deem the fact worth noticing. In addition to Mr. Davis' observations mentioned above (1919), I have only been able to find the following remark by G. and E. Peckham (1898, p. 177): "We have, in several instances, seen two or three queens of our *Polistes fusca*[1] join together and utilize a nest of the preceding year, each one clearing up three or four cells wherein to start her colony, while close by other queens were starting new nests, each building one for herself, being unable to find anything that suited her among the numerous old ones that hung about the place." In connection with this remark, I want to point out that in all of Mr. Nichols' observations two queens were associated in building new nests afresh and not in appropriating old ones. Miss Enteman (1902, p. 340, footnote; and 1904, pp. 17–19), in Illinois, also observed that two and even three females of *Polistes variatus* Cresson, a color form of *P. pallipes,* coöperated in the founding of a nest; she describes in detail the color variation of the offspring of two nests, each founded by two queens.

The starting of a new nest by two or several females has repeatedly been observed in other, exotic members of the genus *Polistes,* though always as an exception. Concerning the common European species, *Polistes gallicus* (Linnaeus), C. T. v. Siebold (1871) states that in four years' observations he found among several hundreds of nests in southern Germany only two colonies with two queens each. P. Marchal (1896, p. 21) observed even three and four queens on some nests. Janet (1903, p. 65) and C. Schmitt (1919, p. 117) have recorded further instances of pleometrosis in this wasp. In a very interesting case, described by Ferton (1901, pp. 128–129), the females of eight nests of this *Polistes* were apparently mixed, so that they would go indifferently from one nest to another. Of the South American *Polistes versicolor* Fabricius, H. von Ihering (1896) says that in Rio Grande do Sul, Brazil, he repeatedly found in the spring a female together with workers on a newly started nest. I believe that these, too, were cases of pleometrosis, since in the tropical *Polistes* it is often hardly possible to distinguish externally workers from fertile females, and in some of the species it is even doubtful whether a differentiated worker caste is present.

---

[1] This name probably refers to one of the forms of *P. pallipes* Lepeletier. [J. B.]

Pleometrosis has also been recorded by P. and N. Rau (1918, pp. 286–288) for the large North American *Polistes annularis* (Linnaeus). Near St. Louis, Missouri, they found on one occasion in the spring several females of this wasp congregating on old nests, as many as 16 being seen clustering on one nest. I doubt, however, whether these wasps intended starting new colonies in that manner; but in the vicinity of these old nests the Raus also observed four new ones, one of these with one queen, one with two, and two with four queens.

The term "pleometrosis" used in the title of this note was originally defined by Wasmann (1910) as "the occurrence of several queen ants of the same species or race in one colony." It can, however, be conveniently extended to other social Hymenoptera and is then the equivalent of "polygyny." Reuter (1913) and Roubaud (1916) have called "polygyny" a condition where several fertile females are present in one colony of wasps, regardless of the manner in which the nest originated, there usually being in such cases no morphological nor physiological differentiation into castes. In monogynous wasp societies, on the other hand, but a single queen is found in each nest, since there is a difference in structure, or in function, or in both between the fertile females and the worker caste.[1] Polygynous insect societies need not of necessity be founded by several fertile females, as is shown by the African wasps of the genus *Belonogaster,* in which there are apparently no true workers, all the females of the nest being externally alike and physiologically equal, capable of being fecundated and of producing mature eggs. Yet in *Belonogaster* a new nest is, as a rule, started by an isolated female, though often two or more queens may associate to found a new society: the single female who started the colony is then joined by other, foreign females at an early period in the construction of the nest; new nests may even originate through swarming, a number of fecundated females leaving together an old nest in order to start a new one (Roubaud, 1916).

Wasmann distinguishes between primary pleometrosis, in which two or more females of the same species or race unite to found a new colony, and secondary pleometrosis. This latter condition may arise either through inbreeding of queens newly hatched in the colony and fecundated in or near the nest; or through subsequent adoption of foreign queens from other colonies of the same species or race; or again through fusion of several neighboring colonies.

The known methods by which a new colony may arise among social Hymenoptera can all be grouped under one of the following three headings (see Crawley and Donisthorpe, 1913):

(1) *Haplometrosis* (Wasmann): a single fecundated female, or queen, seeks a suitable shelter, starts a nest, and raises a new brood of workers alone. This is by far the most common method among the Formicidae, where the female, after the marriage flight, drops her wings, retires into hiding, and founds a new formicary. It is also the rule among many monogynous social bees (*Bombus*) and wasps (*Vespa, Polistes,* etc.).

---

[1] The terms "polygyny" and "monogyny," as applied to social insects, were proposed by Reuter (1913) to replace those of "polygamy" and "monogamy" used with a similar meaning by R. and H. von Ihering. Reuter's terminology is evidently more appropriate and less misleading.

(2) *Primary pleometrosis:* two or several fecundated females start a new colony together. A number of such cases have been described among ants (Wheeler, 1917), but with these insects they are exceptional, and in most cases such formicaries become later monogynous again; one of the queens kills the others, or the colony divides up into two or more societies each with its own queen. It is, however, of rather common occurrence with many of the tropical social Vespidae of the subfamily Polybiinae (Epiponinae), where new colonies are often started by swarms of females and workers leaving the old nest.

The honey-bees (*Apis*) and the Meliponidae also found new communities through swarming, but the procedure in this case is somewhat intermediate between haplometrosis and pleometrosis. Though in these social bees each new colony is, as a rule, founded by a single fecundated queen, she is nevertheless accompanied in the swarm by a detachment of workers, or sterile females, who help considerably in establishing the new hive. It would thus seem that swarming is a primitive habit of social Hymenoptera and dates back from a time when there was as yet no differentiation into castes and pleometrosis was the rule. Among tropical social bees, owing to favorable climatic conditions permitting perennial colonies, swarming was retained and even used to new ends after a worker caste had been developed.

(3) *Allometrosis* (Forel): the female seeks a nest of another species and succeeds in being adopted by this strange colony, whose members bring up her brood. Such cases of social parasitism are thus far only known among ants: they may be temporary, the host colony dying out in course of time after the host queen has been eliminated, so that a pure colony of the intruding female remains; or permanent, the mixed character of the colony being kept up, this condition also presenting various modifications.

I am much in favor of H. von Ihering's and Roubaud's opinion that, among the Vespidae at least, the evolution of solitary into social instincts did not proceed from the habit commonly observed in many solitary wasps of building their nests in close proximity, the isolated nests of different females thus tending to merge gradually, so to speak, into larger, common structures cared for by several females; but that it was rather the outcome of a tendency of the young wasps to stay with their mother upon emerging from the nest (see also Wheeler, 1922, XV, p. 131). These primitive polygynous societies, upon becoming more populous, tended to divide by pleometrosis, the haplometrotic or monogynous condition being much more specialized and of a later date. In true solitary Vespidae (Eumeninae and Zethinae), each mother wasp cares alone for her nest: in the immense majority of species the egg is laid, the food for the young stored, and the cell closed up in a very short time, and the mother rarely, if ever, comes in contact with any of her offspring. Only when certain forms took to nursing, or to provisioning their cells gradually, bringing in prey as the growth of the larva progressed, was an opportunity given to the building up of family groups where the newly hatched offspring could be induced to remain with their mother and coöperate in keeping up the care of the nest. Along the evolutionary road which led from these crude associations to the complicated societies of some of the present-day species the splitting up of a colony into new social units through pleometrotic swarming must have been an important milestone. For this reason it is worth while to investigate whatever vestiges of pleometrosis may be left in the behavior of the present haplometrotic species.

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Synonymy in the Genus Cetema (Diptera).—I can confirm from examination of the Loew type at Harvard and Becker's type in Professor Melander's collection the synonymy given on page 33 of your February number. I informed Mr. Malloch of the results of my type examinations some six years ago.—J. M. ALDRICH, National Museum, Washington, D. C.

TWO NEW SPECIES OF CANTACADERIA[1]

(HEMIP.-TINGITIDAE).

By Carl J. Drake, Ames, Iowa.

Cantacader gounellei n. sp. (Fig. 1, Dorsal aspect.)

Head rugose, very long with four (two on each side) blunt, moderately long, semi-erect spines. Bucculae very long, composed mostly of three rows of cells, meeting a little in front of the head. Rostrum extremely long, reaching to the sixth ventral segment of the abdomen. Pronotum considerably and transversely swollen a little back of the middle, narrowed in front, roundly excavated at the posterior margin, with five carinae, the lateral carinae uniseriate and slightly diverging posteriorly; median carina straight, uniseriate, except at the rather highly arched place (on the raised portion of pronotum) biseriate. Antennae rather long and slender, the third segment slightly more than three times the length of the fourth. Elytra extremely large and very widely expanded; costal area narrow, uniseriate, the areolae a little larger than those of the subcostal area; subcostal area broad, composed of a number of somewhat irregular rows of areolae, the latter about equal in size to those of discoidal and sutural areas; discoidal area large, very long, nearly three-fourths the length of the elytra, with a distinctly raised and prominent median nervure, the latter giving off two or three rather prominent lateral branches on each side; sutural area moderately large, the areolae a little more regular than those of subcostal area; clavus distinctly marked off, triangular, moderately large. Wings a little longer than the abdomen. Length, 6.4 mm.; width, 3.6 mm.

General color yellowish brown, the elytra irregularly suffused with brown and fuscous and with a fairly distinct, transverse fuscous fascia extending on each side from the clavus to the lateral margin. Legs yellowish brown, each femur with a broad brown or fuscous band near the tip. Antennae yellowish brown, the tip of the fourth segment fuscous. Body beneath dark reddish brown.

The very large size, broadly expanded elytra, uniseriate costal area, and extremely long rostrum readily separate this species from *C. tingidoides* (Spinola) or *C. germainii* Signoret.

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[1] Contributions from the Department of Zoölogy and Entomology, Iowa State College, Ames, Iowa.

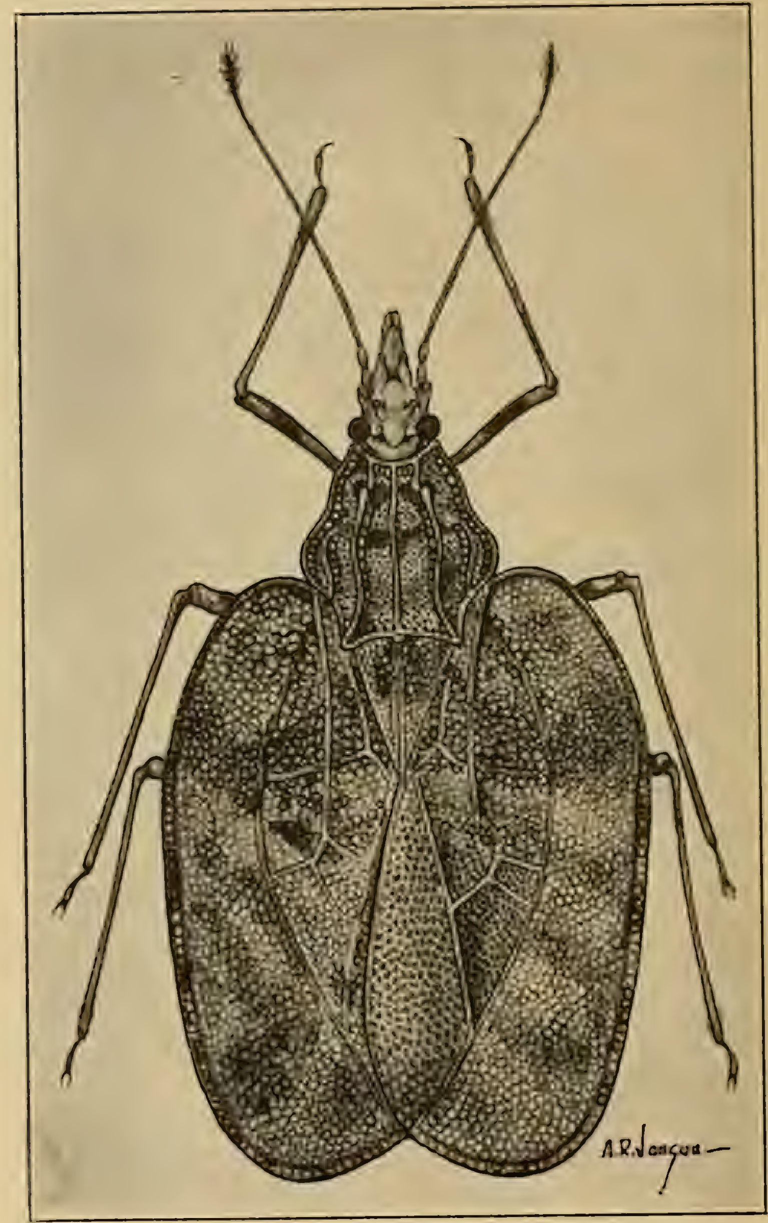

Fig. 1. *Cantacader gounellei* n. sp.

Type taken at Novo Friburgo, a small town about 60 miles northeast of Rio de Janeiro, Brazil, by E. Gounelle, March 2, 1903, in my collection.

The genus *Cantacader* of Amyot et Serville, Histoire Naturelle des Insèctes, Hémiptères, 1843, p. 299, has been represented heretofore in South America by two described species, *C. germainii* Signoret and *C. tingidoides* (Spinola) from Chile. *Cantacader chilinesis* Reed (Drake, Florida Entomologist, Vol. V, 1922, p. 50) belongs to the genus *Teleonemia* of Stål. The neotropical species of *Cantacader* differ from the palaearctic and oriental species in having the pronotum not produced behind so as to cover the scutellum completely.

Cantacader magnifica n. sp.

Head very long, moderately rugose, armed with four blunt, stout, semi-erect spines. The anterior pair distinctly longer than the posterior. Bucculae very long, narrow, projecting a little in front of the head, open in front, the marginal row of cells considerably larger than the others. Eyes prominent, coarsely granulate. Rostrum extremely long, reaching almost to the male genital segment. Antenniferous tubercles large, prominent, blunt and slightly curved inwardly; first antennal segment moderately enlarged, a little longer and thicker than the second; third and fourth segments wanting. Pronotum coarsely punctate, strongly and transversely swollen through the disc, with four carinae, the lateral carinae slightly divaricating posteriorly; each carina thick, distinctly raised and without distinct areolae, except the median in front. Pronotum moderately produced behind, completely covering the scutellum, with two moderately deep and broadly rounded excavations on each side; deeply and broadly and roundly excavated in front. Paranota broad, thick, slightly reflexed, more broadly expanded in front than behind, with six or seven rows of areolae in front and only one on the posterior portion. Elytra extremely large, very widely expanded, considerably longer and very much broader than the abdomen; costal area uniseriate throughout, the areolae slightly larger than those of the subcostal area; subcostal area extremely broad, composed of about 16 or 18 rows of areolae at its narrowest part, the areolae about equal in size but not arranged in definite rows; discoidal area large, extremely long, reaching almost to the end of the abdomen, with a distinctly raised and prominent median nervure, the latter giving off two or three costate lateral branches on each side; sutural area moderately large and the clavus distinctly marked off. The wings a little shorter than the abdomen. Length, 7.72 mm.; width, 4.3 mm.

General color dark yellowish brown, the elytra slightly suffused here and there with yellow. Pronotum brown. Body beneath brownish, the venter much darkened along the middle.

Type, male, from Perak, Malacca, Malay Peninsula, in my collection. In general appearance this species very closely resembles *C. gounellei* n. sp., but may be readily separated from it by the larger size, the exposed scutellum, and the differently shaped paranota and posterior margin of the pronotum.

NOTE ON EVERGESTIS STRAMINALIS HÜBN.

Since the publication of Bulletin 868, U. S. D. A., on the European horseradish webworm, by which name this species is known, Mr. Neale F. Howard has reported its occurrence at Green Bay, Wis., where larvae were found fairly common August 15, 1915, in all stages. During the last week of June, 1921, the larvae occurred sparingly at Arlington, Va., where most of the observations recorded in the bulletin were made, although many leaves showed where larval attack had occurred. It is noticeable that young and tender leaves are largely protected by outer leaves. Several species of birds have been noted frequently in the vicinity of infested horseradish patches, and although absolute evidence was not obtained, it is more than probable that larvae are captured because of the scarcity of the latter. Of birds observed, the song sparrow and catbird were most abundant, running along between rows, and the former was frequently seen going under the plants.

F. H. Chittenden, Washington, D. C.

NOTICE TO SUBSCRIBERS.

The April number was mailed cn May 24, 1923. If you have not received it, write us at once.

A COMPARISON OF THE TERMINAL ABDOMINAL STRUCTURES OF AN ADULT ALATE FEMALE OF THE PRIMITIVE TERMITE MASTOTERMES DARWINENSIS WITH THOSE OF THE ROACH PERIPLANETA AMERICANA.*

By G. C. Crampton, Ph.D., Amherst, Mass.

Through the kindness of Dr. Tillyard, I was able to describe and figure the terminal abdominal structures of an adult alate male and female *Mastotermes,* as well as the ovipositor of the soldier caste of this intensely interesting termite (Crampton, 1920), but since I was allowed to retain only one alate specimen, I preferred to keep it intact for future study, instead of risking injuring it irreparably in attempting to force apart the plates at the tip of the abdomen to see what might lie beneath them, so that only the external features were figured in the earlier paper on *Mastotermes.* Recently, however, my curiosity got the better of me, and upon forcing down the terminal ventral plate of my specimen (which unfortunately necessitated tearing its basal connection to some extent) I was delighted to find hidden beneath the "hypogynum" (*hg* of Fig. 2) a fully formed ovipositor composed of three pairs of well-developed valves—a thing never before found in any winged termite, so far as I am aware!

The parts at the base of the ovipositor of the specimen from which the accompanying drawing was made were much shrunken, and since I have not been able to examine a specimen in which the parts are more normal, and since I did not wish to do more damage to my only specimen than was absolutely necessary to expose the ovipostor sufficiently to examine and sketch the parts without dissecting them out, the accompanying figure of the ovipostor of *Mastotermes* is not as accurately detailed as I am hoping to figure the parts of an alate female, when I can obtain more material for dissection and study. The ovipositor of *Mastotermes,* however, is such a unique structure, and this termite is of such great phylogenetic importance, that I have ventured to present the main features of the ovipositor, leaving the more detailed description until material for dissection is available.

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* Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass.

The terminal abdominal structures of an adult female roach (Fig. 1) are somewhat more primitive than those of the adult female of *Mastotermes* (Fig. 2), so that it is preferable to define the parts in the roach before taking up the comparison of the parts in the two insects. As has been shown by Wood-Mason, 1879, Walker, 1919–1922, and others, the ovipositor of immature female roaches is much more like that of the primitive Apterygotan *Machilis* in character than is true of the ovipositor of an adult female roach. In the immature roaches, the limbs of the ninth abdominal segment (which form the dorsal and inner valvulae of the ovipositor) consist of the following parts: A short, broad coxite, homologous with the protopodite of a biramous Crustacean pleopod, forms one of the dorsal valves of the ovipositor, and bears at its tip a stylus which represents the exopodite of a Crustacean limb, while the endopodite of the limb is represented by the inner valve of the ovipositor. When the roach becomes adult, the stylus becomes lost, and the coxite which bore it becomes elongated to form the slender dorsal valve, or dorsovalvula *dv* of Fig. 1 (also called the lateral gonapophysis). The inner valve becomes the intervalvula *iv* of Fig. 1 (also called posterior gonapophysis), while the antero-lateral portions of the ninth sternite become somewhat displaced and form the plates termed the valvifers by Crampton, 1917. The ventral valvulae or ventrovalvulae *vv* of Fig. 1 (also called anterior gonapophyses) probably represent the endopodites of the limbs of the eighth abdominal segment. The styli of these limbs are not present in immature roaches. The coxites of the limbs of the eighth abdominal segment are probably represented by the basal plates of the ventral valvulae called the basivalvulae by Crampton, 1917.

As was mentioned above, the ovipositor of the adult female roach (Fig. 1) consists of a pair of dorsal valvulae *dv*, a pair of intermediate valvulae *iv*, and a pair of ventral valvulae *vv*, of which the dorsal and intermediate valvulae belong to the ninth abdominal segment, while the ventral valvulae belong to the eighth abnormal segment. Similarly, in the adult alate female of *Mastotermes*

(Fig. 2) there is a pair of dorsal valvulae *dv,* a pair of intermediate valvulae *iv,* and a pair of ventral valvulae *vv,* which are extremely like those of the roach, and clearly indicate that the Isoptera are very closely related to the Blattids, as is also shown by many other characters such as the nature of the wings of *Mastotermes,* the character of the cervical sclerites, etc.

In the female roach (Fig. 1) there is a modified portion of the eighth abdominal sternite *sg* (called the subgenitale by Crampton, 1917) situated below the genital aperture. A similar structure occurs in the Mantids, but I could not detect any traces of it in my specimen of *Mastotermes* without tearing the parts more than I care to do at this time. The subgenitale *sg* of Fig. 1 becomes the subgenital plate (modified eighth sternite) in Orthoptera, Phasmids, etc.

In the Isoptera, Blattids, and Mantids (*i.e.,* the insects belonging to the superorder Panisoptera) the seventh sternite becomes elongated posteriorly to form a subgenital valve or hypogynum *hg* of Figs. 1 and 2, which partly conceals the ovipositor in Mantids, and completely hides the ovipositor in most Blattids and such termites as have an ovipositor. I do not know what function this structure has in *Mastotermes,* but in the roach shown in Fig. 1 the inner walls of the hypogynum *hg* form the lining of an oothecal cavity in which the ootheca is carried about by the mother roach for a period, and the membranous lining of the distal portion of the hypogynum, in particular, serves to protect the egg capsule until the walls of the ootheca become hardened. It is probable that in Blattids, Mantids, and Isoptera the hypogynum forms a genital cavity functioning in the process of mating. In the roach shown in Fig. 1 the hypogynum is divided into a basal region or basihypogynum *bhg,* and a distal region or distihypogynum *dhg,* the latter being partly divided by a longitudinal cleft into two lobes connected by a portion of the distihypogynal membrane. During the period of carrying the ootheca the distihypogynal membrane becomes distended (as is also true of the general membrane in the region of the ovipostor), and plays an important rôle in protecting the ootheca, as was mentioned above.

The paraprocts *pa,* or parapodial plates of the termite shown in

Fig. 2, are quite like the paraprocts *pa* of the roach shown in Fig. 1; but the cerci *ce* of the termite are not as well developed as those of the roach. Certain termites, such as *Architermopsis,* however, have quite large and well-developed cerci. In this connection, I would call attention to the fact that certain sawflies have long slender cerci quite suggestive of those of *Architermopsis,* as I hope to show in a subsequent paper dealing with the anatomy of the sawflies.

In the Isoptera and Blattids the epiproct *ep* (Figs. 1 and 2) is largely formed by the tenth tergite, and in the Mantids also the tenth tergite is large (and the eleventh tergite becomes greatly reduced and is largely concealed by the tenth). I am not sure that the posterior portion of the plate labeled *ep* in Fig. 1 is not the representative of the eleventh tergite, but I have provisionally interpreted it as a posterior portion of the tenth tergite. The ninth and eighth tergites labeled 8^t and 9^t in Fig. 1 are greatly narrowed in the roach there depicted, but in other roaches they are a little broader. In the absence of a marked reduction or narrowing of these tergites in the Isoptera, the latter resemble the Phasmids and Orthoptera in some respects.

Taking the terminal structures in general, *Mastotermes* resembles the Blattids more than any other insects, and in connection with other features such as the venation of the wings, the character of the cervical sclerites, etc., a study of the ovipostor, hypogynum, etc., in *Mastotermes,* would materially strengthen the view that the Isoptera are more closely related to the Blattids than to any other living insects, and likewise indicates that the superorder Panisoptera (composed of the Blattids, Mantids, Isoptera, etc.) is a natural one. In some respects, the Dermaptera bear a marked resemblance to the members of this superorder, but for the present, at least, I would leave the Dermaptera in the superorder Panorthoptera (including the Orthoptera, *s. str.,* the Phasmids, etc.).

The study of the structures present in *Mastotermes* is of prime importance, since it is one of the most primitive representatives of the order Isoptera, and the Isoptera are in many respects the nearest living representatives of the Protorthoptera-like ancestors of the Psocids (including the Zoraptera) and the Hymenoptera (with their holometabolous allies). In this connection, it should be noted that organisms are not equally primitive or equally specialized in all parts of their bodies (*i.e.,* an individual may be heterarchaic or heterocaenic in different parts of its body) and on this account it is not safe to use one set of features in attempting to determine the ancestry of insects in general. Thus the presence in all known Isoptera of a laterosternite, or lateral plate of the sternal region of the meso- and metathorax (which is found in many immature Ephemerids, Plecoptera, and other primitive insects, as well as in the adults of the Embiids, Dermaptera, Grylloblattids, etc.), while no known Blattid has retained this plate in its primitive condition, would preclude deriving the Isoptera directly from the Blattids as Handlirsch, 1921, has done; and this, together with many other features, clearly indicates that the Isoptera are descended from types ancestral to the Blattids (such as the Protoblattids) or the common Protoblattid-Protorthopteran stock called the Prodictyoptera. In fact, as I have pointed out in a recent paper (Crampton, 1922), the wings of the primitive Isoptera, such as *Mastotermes,* partake of *both* Protoblattid and Protorthopterous characters, and hence the Isoptera were probably descended from the common Protoblattid-Protorthopteran stock (*i.e.,* the Prodictyoptera), from which the Blattids and Mantids were also derived.

In the paper describing the ovipositor of the mature female of the soldier caste of *Mastotermes* (Crampton, 1920) I emphasized the fact that the ovipositor of this *mature* termite resembled the ovipositor of an *immature* female roach in that the styli were present in both, and the coxites of the ninth abdominal segment were short and broad in both. These features are a retention of the primitive condition of the coxites and styli exhibited by such archaic Apterygota as *Machilis.* The ovipositor of an *adult* alate female of *Mastotermes* is like the ovipositor of an *adult* roach, but the ovipositor of an *adult* (or mature) female or worker of *Mastotermes* is like the ovipostor of an *immature* roach, so that the condition occurring in the ovipositor of the mature soldier or worker termite may be regarded as an arrested primitive infantilism (archipaedism) carried over into, or retained by, the mature stages of the insect. Why the soldier and worker caste should exhibit this "primitive infantilism" (archipaedism), while the alate adult female does not, is not apparent, unless the worker and soldier castes represent stages more primitive than the alate females do—a conclusion to which few entomologists would subscribe!

The tendency nowadays is to attribute to "convergence" (supposedly the result of the operation of similar environmental conditions) many of the resemblances between the different orders of insects, which, in some cases at least, are really the result of the operation of the same factors inherited from a common source. Despite the protests of Mr. Bryan and the Oklahoma legislature, most scientists, I believe, will attribute the close resemblance between man and the higher apes, for example, to the presence in both of a great number of factors (genes or determinants) inherited from a common source. Man and the lemurs have fewer factors in common, and hence resemble each other more remotely. Man and the rest of the mammals have still fewer factors in common, and hence resemble each still more remotely, and so on, "ad infinitum." The vertebrates all bear a certain fundamental resemblance to each other, due to the retention in all of them of certain factors (genes or determinants) in common, and similarly, the arthropods resemble each other in their fundamental features due to the presence in all of them of certain factors which they all inherited in common. Now, if all arthropods can inherit some factors from a common ancestry, why can not several orders of insects descended from a common source inherit a number of factors (genes or determinants) in common, from their common ancestry, and why is it not reasonable to suppose that the presence of certain factors in common (inherited from a common source) in two or more orders of insects descended from the same ancestral group, will cause the derived orders to parallel each other rather closely in certain of their evolutionary tendencies? I can see no objection to this view, and it appears to me that the closeness of the parallelism in the two orders in question will be in direct proportion to the numbers of factors they have inherited in common. Resemblances resulting from such a "parallelism" due to the inheritance of certain factors in common by two groups of animals (*i.e.*, euparallelism or homogenic parallelism) represent true homologies, and are hence to be distinguished from superficial resemblances due to " convergence " or " parallelism " in the usual sense of the word, since the latter resemblances are more of the nature of " analogies." I believe that the tendency to develope social habits exhibited by certain Isoptera, Hymenoptera, Psocids, etc., is a case of euparallelism (or homogenic parallelism) due to the operation of certain factors (genes or what-not) inherited from a common Protorthopteroid ancestry, and I also believe that many cases of resemblance now regarded as the result of " convergence " (*i.e.*, supposedly due to the action of similar environmental conditions) are in reality instances of euparallelism (*i.e.*, are due to the operation of factors inherited in common), but since this idea has been developed in another paper (Crampton, 1922_a), there is no necessity of discussing it further here.

In connection with the preceding discussion of the relationship of the Isoptera to the Orthoptera, the fact that the Grylloblattids are the nearest allies of the Isoptera among the Orthoptera (*s. str.*), and the fact that the Isoptera serve to connect the Orthoptera (including the Grylloblattids) with the rest of the Blattoid insects (*i.e.*, the Panisoptera) in many respects should have been more strongly emphasized. Among the Orthopteroid insects (Panorthoptera) the Phasmids are very closely allied to the Grylloblattids (*i.e.*, in the nature of their head capsule, tarsi, tergal plates, and terminal structures) and the Phasmids are somewhat nearer the Mantids among the Panisoptera than they are to the Isoptera. Thus the Isoptera are not the only important forms among the Blattid-like insects (Panisoptera) which approach the Protorthopterous ancestors of the Orthoptera, but they have retained many features suggestive of these ancestors of the Orthoptera (as well as the ancestors of the Psocids and even the Hymenoptera and their allies), so that a study of the Isoptera is of considerable interest from the standpoint of phylogeny, and more attention should be given them in this respect than has hitherto been accorded them.

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ABBREVIATIONS.

7^t, 8^t, 9^t, etc.	Tergites of the seventh, eighth, and ninth abdominal segments.
7^s	Sternite of the seventh abdominal segment.
bhg	Basal region of hypogynum (basihypogynum).
ce	Cercus.
dhg	Distal region of hypogynum (distihypogynum).
dv	Dorsal valves of ovipositor (dorsovalvulae), also called lateral gonapophyses.
ep	Epiproct or pygidium.
hg	Seventh sternite prolonged beneath ovipositor (hypogynum).

iv	Intermediate valves of ovipositor (intervalvulae), also called posterior gonapophyses.
pa	Paraprocts or parapodial plates.
sg	Eighth sternite or subgenitale, which forms subgenital plate in Orthoptera.
sp	Spiracle.
vv	Ventral valves of ovipositor (ventrovalvulae), also called anterior gonapophyses.

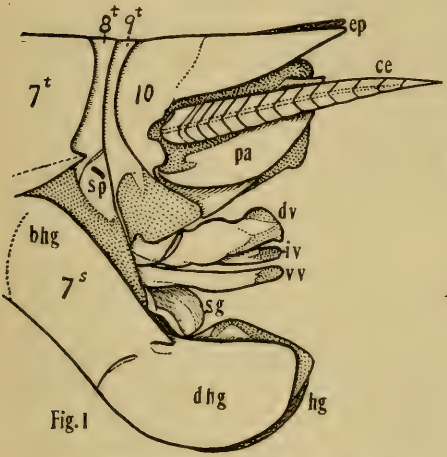

Fig. 1

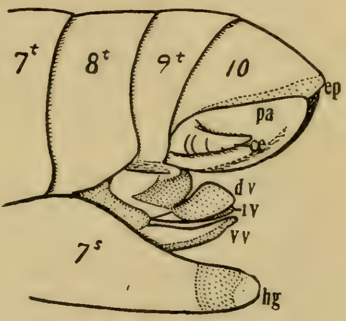

Fig. 2

EXPLANATION OF PLATE.

FIG. 1. Lateral view of terminal abdominal segments of the roach *Periplaneta americana*.

FIG. 2. Same of the termite *Mastotermes darwinensis*.

A Correction.—The record of *Amblyscirtes vialis* Edwards in my list of butterflies collected in Florida, March, 1921, BULLETIN xviii, 1, page 27, is incorrect; please substitute in place of same *Amblyscirtes alternata* Grote and Robinson. In nomenclature this follows Dr. Lindsey in his "*Hesperioidea of America North of Mexico*," and not Barnes and McDunnough's *Check List*.—E. L. BELL, Flushing, L. I., N. Y.

NOTES ON TRICHOTHRIPS ULMI (FAB.)[1] IN NEW JERSEY.

By Harry B. Weiss and Ralph B. Lott, Highland Park, N. J.

Very little appears to be recorded concerning this species of thrips which is common and widely distributed at least in New Jersey. It is a large, black species which is found under the bark of decaying trees, and it also inhabits various polyporoid fungi. The nymphs and pupae are red and the adults black. Usually they occur in colonies of a few to hundreds of individuals.

In New Jersey this species, in addition to being found under dead bark, has been observed in the following fungi, all of which belong to the *Polyporaceae*—*Polyporus versicolor, P. gilvus, P. betulinus, P. hirsutus, P. pargamenus, Lenzites betulina, Fomes applanatus, F. lobatus, Daedalia quercina.* Sometimes *Polyporus versicolor, P. betulinus,* and *Daedalia quercina* are heavily infested. On the whole, however, *versicolor* and *betulinus* appear to be the favorite ones.

At Monmouth Junction, N. J., on July 21, various stages of this thrips were observed feeding on the ends of the tubes of *Fomes lobatus.* They were feeding in groups and had kept the tubes from attaining their normal length, with the result that slight depressions were apparent wherever the insects had congregated and fed for any length of time. Specimens were also observed feeding on the mycelial filaments on the upper surface of young sporophores of *Sterium fasciatum.* Eggs, early stages, and adults were found throughout the summer. Larvae and adults were observed under bark during the winter months and on warm days were more or less active when disturbed.

As early as the last of May eggs were found in *Polyporus betulinus* together with larvae and adults. The entire fungus was inhabited, but for the most part the insects were found in the tubes in little cavities or chambers. Some cavities contained several nymphs in various stages of development and an adult or two, while attached lightly to the walls were the dirty, yellowish to pearly white comparatively large eggs arranged in rows of five or six. This particular fungus which was the previous year's sporophore was more or less dry, especially the tubes, where most of the insects were found. Very often the thrips were found in cavities made by other insect enemies of the fungus. At Lakehurst, N. J., on July 6, specimens of *Polyporus versicolor* were found to contain groups or masses of eggs laid in irregular patches, each patch containing two or three hundred eggs. These eggs were laid close together on their sides and occurred on the upper surface of the fungus. Very little regularity in the positions of the eggs was apparent and many single eggs were scattered over the fungus surface. Nymphs and adults were present also.

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[1] Identified by Mr. A. C. Morgan through the courtesy of Dr. L. O. Howard.

At Monmouth Junction, N. J., on September 6, eggs, all larval stages, pupae and adults were found beneath the bark of a log covered by sporophores of *Polyporus versicolor.* The eggs occurred on the inner surface of the thin layer of bark in irregular patches one-quarter to one-half inch in diameter, each patch being made up of several hundred eggs. When first hatched, the nymphs are whitish and gradually assume their red color. It is not known whether reproduction is bisexual or unisexual. Females were much more plentiful than males.

The following descriptions refer to the stages which were found by making collections more or less regularly from May to September, and the different stages referred to under prepupa and pupa are preliminary to winged and wingless adults, although breeding work should be done in order to connect them up definitely.

> *Egg:* Length 0.45 mm. Width 0.15 mm. Pearly white to sordid white. Elongate-oval or elliptical, both ends broadly rounded, sides subparallel tapering slightly to broadly rounded ends. Slightly flattened on one or more sides depending on whether deposited singly or close to others.
>
> *Mature Larva:* Length about 2.7 mm. Width of metathorax about 0.5 mm. Body fusiform. Antennae, head and dorsal plates of prothorax and legs light brown. Last two abdominal segments dark brown to blackish. Remainder of dorsal surface mottled with red. Ventral surface lighter red. Antennae seven-segmented, first two short, subcylindrical, third segment longest, remainder diminishing in length to ultimate segment which is shortest of last five. Third, fourth, fifth and sixth antennal segments noticeably widened at distal ends. Head narrow, widening very slightly posteriorly. Prothorax trapezoidal, narrow anteriorly, gradually widening posteriorly, two-thirds of dorsal surface covered by a chitinous plate which is divided by a light, narrow median line. Mesothorax trapezoidal, sides gradually widening posteriorly, length

about the same as that of prothorax. Metathorax little more than one-half as long as mesothorax, widest segment of body, sides arcuate. Abdomen ten segmented, first segment widest, remainder gradually tapering to last two which are subtubular and slightly conical. Each abdominal segment except the last three bearing six fine, dorsal, setae arranged in a transverse row, three on each side of a median line, all arising from minute, blackish tubercles. Last three abdominal segments with longer setae arising from posterior edges of segments. Dorsal setae slightly more numerous on thorax, especially on mesothorax. Legs, head, antennae bearing several short setae. Legs comparatively long.

Prepupa and Pupa: Length about 2.8 mm. Width of metathorax about 0.6 mm. Color and shape somewhat similar to those of mature larva except that first or second abdominal segment is widest and body gradually tapers anteriorly and posteriorly. Fore femora somewhat thickened. Dorsal chitinous plates on head and thorax appear to be missing from this stage. Legs, antennae, wing pads and last two abdominal segments whitish. In some specimens antennae are shortened into short, club-like appendages each about as long as the length of the head. These extend forward and outward and are not laid along the sides of the head. Such specimens appear to be devoid of wing pads. Other specimens bear longer antennae which are laid along sides of head reaching back about two-thirds the length of the head. These specimens bear short, somewhat cylindrical wing pads each a little shorter than the length of the metathorax. Still other specimens have well-developed, narrow, cylindrical wing pads which are pointed at tips. Those of mesothorax reach to middle of first abdominal segment and those of metathorax reach to middle of the second abdominal segment. In addition another stage was observed as follows: Length about 3.2 mm. Width of abdomen 0.6–0.7 mm. Color reddish except antennae, legs, wing pads which are whitish or brownish. Spindle shaped, widest at second or third abdominal segment, tapering acutely posteriorly. Head subrectangular, slightly longer than wide. Antennae extending backward along sides of head and reaching almost to middle of ventral surface of prothorax. Prothorax trapezoidal, sides strongly oblique; mesothorax shortest of thoracic segments. Fore femora greatly thickened. Wing pads only about as long as metathorax, tubular, tapering to point. They appear to be rudimentary, probably containing the vestiges of wings which are present in wingless adults. Body bearing numerous fine setae which are longest posteriorly.

Adult: This was described by Fabricius in 1781 (Species Insectorum, Tom. II, p. 396) and his description follows:

"Thrips ulmi.

> "T. nigra, alis niueis ciliatis, ano acuminato. Thrips Corticis nigra, alis hyalinis, niueis barbis longissimis, antennis octonodiis. Degeer Ins. 3.11.3, tab. 1, fig. 8–13.
>
> "Thrips elytris albidis, corpore nigra abdominali seta. Geoff. Ins. 1.384.1, tab. 7, fig. 6.
>
> "Habitat in Ulmi corticibus gregaria."

In the Entom. Magazine for 1836, Halliday has the following to say concerning this species, "Inhabits under the bark of old trees feeding on mucor." According to Mr. A. C. Morgan, this species has been found at Newton, Pa.

A NEW LONGICORN BEETLE FROM THE CATSKILL MOUNTAINS.

By Wm. T. Davis, Staten Island, N. Y.

The following described insect resembles an immaculate male of *Saperda fayi* Bland. It is of the same shape, but is a little larger than any male *fayi* examined. In their Monograph of the genus Saperda, N. Y. State Museum, Bulletin 74, 1904, Felt and Joutel figure *fayi*, and give the following characters: Antennae unicolorous; elytra with spots, rarely unicolorous; cinnamon brown with a white stripe on each side of the thorax continuing on elytra at humeral angles; the elytra with two white spots, one at the middle, the other near the apex and almost sutural; sides and under surface white; the spots are more or less obsolete in the male. Process on front and middle tarsal claws slightly developed. On page 10 is the statement that "this process is subject to variation as to size and form in individuals of the same species and has been used as a specific character as little as possible."

The differences from *fayi* are given in the following description:

Saperda shoemakeri n. sp.

Type male, collected on apple near Slide Mountain, Catskill Mountains, N. Y., July 10, 1922 (Ernest Shoemaker). Shoemaker collection.

> Antennae short, nearly unicolorous, the first three joints black, the succeeding joints somewhat paler. Seen from above, head and pronotum cinnamon brown, unicolorous, less hairy than in *fayi*. Elytra nearly unicolorous, blackish centrally, dark reddish-brown on the humeral angles and along the outer margins; less hairy than in *fayi;* a sutural depression extends from the base about one-fifth of their length, on either side of which is an oblong, tumid, elevation, followed posteriorly by an oblong depression, which is anterior to the location of the white spots in *fayi*. Scutellum with the extremity more drawn out than in any *fayi* examined, where the breadth and length are more nearly equal. Beneath, head and thorax brownish with silvery pubescence at sides; abdomen black, with darker pubescence than on the sides; legs dark with pale pubescence, the first pair almost wholly black; process on front and middle tarsal claws, as in *fayi*. Length 7 mm.

The writer was at first inclined to describe this insect as a variety of *fayi,* and indeed it may be such, but aside from the differences in color between it and any *fayi* examined, is the presence of the well-marked depression at the inner base of the elytra and the tumid elevations of the one, and the absence, or very slight indications of the same, in the other.

We are under obligations to Mr. Charles W. Leng, Mr. Charles Schaeffer, and also to Mr. Andrew J. Mutchler, of the American Museum of Natural History, for making comparisons with specimens in their collections or in those in their charge.

RECENT PUBLICATIONS ON TROPICAL ENTOMOLOGY.

By J. Bequaert, New York, N. Y.

The last twenty years have seen the rapid rise of entomology from the subordinate position which the twentieth-century zoölogist had given it to a prominent place among biological sciences, and the recent world-wide disturbances have but emphasized its importance. Yet to the mind of the vast majority of educated persons, even among those who profess to keep abreast of scientific progress, the study of insects is still regarded as little more than a harmless hobby. Not until the white—and yellow—races are forced, through the migratory impulse of their steadily increasing multitudes, to invade the immense virgin and practically uninhabited equatorial areas of the earth can the entomologist truly come into his own. Indeed, the conquest and assimilation of the tropics by civilized man will be a ceaseless struggle against the insect. We are at present witnessing the beginnings of this movement, which is bound to gain in momentum as years go by. The following three publications may well serve to illustrate the growing importance of entomology for the progress of civilization in tropical regions:

1. Les Moustiques. Moeurs et Moyens de Destruction. By E. Hegh. (Imprimerie Industrielle et Financière, Brussels, 1921.) One volume, small octavo, of 239 pp., with 105 text figures.

This pamphlet is a revised and enlarged edition of a booklet published in 1918, at London, by the Colonial Office of the Belgian Government. It aims at furnishing the means by which white settlers in the Belgian Congo may protect themselves from the attacks of disease-transmitting mosquitoes. Two thousand copies have been subscribed for by the Belgian Colonial Office for free distribution to its officials, to missionaries, and to colonists in the Congo, and Mr. Hegh informs me that a large number of them have also been ordered by the French, Italian, and Portuguese Colonial Governments.

The efforts to teach European settlers in tropical countries how to avoid the dangers of mosquitoes are fully justified, for these insects are undoubtedly the most abundant and most subtle enemies of health. Of the several diseases which they transmit, malaria and yellow fever are the best known, but there are others, such as filariasis, due to minute worms living in the blood-vessels, and dengue fever, a grippe-like infection, that are also very troublesome in tropical regions. Mr. Hegh points out the part mosquitoes play in infecting man with these various diseases. He then shows briefly the morphology and bionomics of these insects, so as to enable the layman to recognize the most dangerous species, while a knowledge of the habits of the larvae and adults is indispensable if one wants to fight them successfully. The various methods by which this may be accomplished take a considerable portion of the book (pp. 81–190). They include: personal protection against the bites of these insects, indoors as well as outdoors; the suppression of virus carriers through medical treatment and isolation; and the destruction of adult mosquitoes, their larvae and breeding places. Of all these the control or suppression of breeding places give by far the best results, and Mr. Hegh is careful to point out that yellow fever and malaria can actually be eradicated by this method, taking as examples the splendid work accomplished by Dr. Gorgas and his aids in Cuba and Panama. Instructions for collecting and studying mosquitoes, a key to the African species of *Anopheles,* and a table of their distribution follow. The work concludes with a valuable bibliography.

For those who have not time or inclination to read the entire pamphlet, I may mention that on pp. 215–217 Mr. Hegh presents in concise form the best means by which Europeans in tropical and subtropical countries may protect themselves and others against mosquitoes and the diseases they carry.

2. TSETSE-FLIES. THEIR CHARACTERISTICS, DISTRIBUTION AND BIONOMICS, WITH SOME ACCOUNT OF POSSIBLE METHODS FOR THEIR CONTROL. By E. E. Austen and E. Hegh. (The Imperial Bureau of Entomology, London, 1922.) One volume, small octavo, of ix + 188 pp., with 5 plates and 19 text figures.

This publication is a revised English edition of a work published by Mr. E. Hegh at London, in 1915, under the title "*Notice sur les Glossines ou Tsétsés,*" which contained a résumé of the life-history and distribution of tsetse-flies. In the present book, however, not only has the information with regard to distribution and bionomics been brought up to date, but Major E. E. Austen, the eminent authority on blood-sucking insects, has added an account of the classification and characteristics of the several species of *Glossina.* I understand that a new French edition of this pamphlet will be issued shortly by Mr. Hegh.

Nowadays this genus of flies is restricted to Africa and southwestern Arabia, where it is, however, of tremendous importance, since all the species are capable of transmitting one or more of the devastating trypanosome diseases (the so-called trypanosomiases). One of these, the African human sleeping sickness, causes terrible ravages among native populations, limiting the amount of labor available for agricultural and commercial enterprises. The others, often designated under the collective name of Nagana, affect domestic animals; they entirely prevent stock-raising in extensive areas and in some cases compel European colonists to have recourse to mechanical assistance for transport purposes and the operations of clearing and cultivation.

After a short general account of the genus *Glossina*, its distribution and classification (Chapter I), the distinctive characters and geographical distribution of the various species are dealt with at great length (Chapter II). Chapter III is devoted to the reproduction of these flies, which presents many peculiarities, since it is one of the very rare cases among Diptera where the female, instead of laying eggs, produces at each birth a single full-grown larva which almost immediately changes into a pupa. The breeding places and breeding season are studied in Chapter IV, from which we learn that these are far from being similar for the several species. In Chapter V the interesting problem of the "fly-belts" is fully discussed, while Chapter VI treats of the distribution of tsetse-flies in the Belgian Congo. Chapter VII deals with some points in the bionomics, such as seasonal migrations, range of flight, traveling habits, resting places, and relative proportion of the sexes. Several chapters (VIII to X) cover the important problem of the food of these flies and the much-mooted question of their relation to smaller animals and to big game. After a study of the effects of external factors (Chapter XI), the means of limiting and destroying tsetse-flies are reviewed, including accounts of their predaceous enemies and parasites (Chapters XII to XIV). The three following chapters are devoted to practical hints for the study of these Diptera, and the work concludes with a bibliography of 171 titles, the principal publications consulted by the authors.

I have thought it worth while to give a rather lengthy account of the contents of this monograph, because it splendidly illustrates the modern method of studying entomology, namely, as a thorough blending of taxonomy and of the study of the individual habits of the insect and its relations to the environment. Perhaps no other single genus has ever before been so completely investigated in these various aspects as *Glossina,* and for this reason the perusal of Austen and Hegh's comprehensive account may prove of interest to entomologists even outside Africa.

3. LES TERMITES. PARTIE GÉNÉRALE: DESCRIPTION; DISTRIBUTION GÉOGRAPHIQUE; CLASSIFICATION; BIOLOGIE; VIE SOCIALE; ALIMENTATION; CONSTRUCTIONS; RAPPORTS AVEC LE MONDE EXTÉRIEUR. By E. Hegh. (Imprimerie Industrielle et Financière, Brussels, 1922.) One volume, small octavo, of 756 pp., with 460 text figures and one map.

This profusely and splendidly illustrated volume is a rearranged and much extended reprint in book-form of a series of articles which Mr. E. Hegh contributed to the "Bulletin Agricole du Congo Belge" from 1920 to 1922. The termites, also, but rather inappropriately, called "white ants" in English, occur in the tropics in enormous numbers, and since, in their insatiable appetite for cellulose, they attack almost any lifeless material, with the exception of stone, glass, metal, and certain kinds of wood, they are justly regarded as the most destructive power in the warm regions of the earth. Stored foodstuffs, lumber, furniture, clothing, books—in short, most of the paraphernalia of civilization—must constantly be guarded against their depredations. "It has even been claimed that their fondness for literature is in part responsible for the slow cultural growth of many tropical countries" (W. M. Wheeler). In addition to their practical importance, termites are of great interest to the naturalist, as being one of a few groups of animals that live together in organized colonies, showing at least a superficial similarity to human societies.

In the first chapter of his work Mr. Hegh gives us a description of the external and internal structure of these insects, followed in Chapter II by an account of their geographical distribution and classification. Chapter III discusses the various types of individuals, the so-called castes, that are found in a colony, and also the reproduction, bionomics, and social life. The feeding habits take up a very extensive chapter (IV, pp. 219–372), which is, of course, of tremendous economic interest, but makes us also acquainted with many remarkable features of insect life, such as the foraging columns of certain species and the fungus-gardens of many of the Old World forms. Chapter V is hardly less interesting, since it is devoted to the nests, the so-called termitaria, of which there is an almost endless variety: from simple galleries burrowed in the soil or in dead wood, to complicated buildings of earth or carton below or above the ground or up in trees. In the architecture of their nests termites seem to have outdone the ants and to come close second to the social wasps. The numerous ecological relations of termites to their environment (Chapter VI) also make most fascinating reading: they include the relations of different species of termites to one another; their predatory enemies, among which certain mammals are by far the most important; their external and internal parasites; the multiple guests with which they are blessed as much as the ants; and finally their relations to the plant world and their importance to the agriculturist and the geologist. An appendix to this chapter contains many curious details regarding the use natives of various tropical countries make of termites to increase their food supply. The book concludes with an enumeration of the species and forms of termites hitherto described from Africa and an extensive bibliography.

In his introduction Mr. Hegh says that the present work will be followed by a second volume. It may appear as if he had already exhausted the subject, but the author informs us that he will next study in detail the characters, distribution, nests, and habits of the tropical African species; then treat of the damage for which termites are responsible and of the various means by which they may be kept in check; and finally give practical instructions as to how to study them. We shall look forward with intense interest to the publication of this second part of Mr. Hegh's admirable work.

A NEW NORTH AMERICAN NOTONECTA.

By J. R. de la Torre-Bueno, White Plains, N. Y., and R. F. Hussey, Bussey Institution, Boston, Mass.

Notonecta borealis n. sp.

Notonecta lutea Bueno 1904, Ent. News xv: 220; and 1905, Journ. N. Y. Ent. Soc. xiii: 160, pl. 7, fig. 7 (nec O. F. Müller 1776, Zoöl. Dan.: 103).

Notonecta borealis Hussey 1919, Occ. Pap. Mus. Zoöl. Univ. Mich. No. 75: 16 (without description).

Head: width, including eyes, two and one half times the length (3.8: 1.5); front (vertex of Kirkaldy) slightly over twice as wide as vertex (synthlipsis of Kirkaldy) at its narrowest point, somewhat tumid medially; eye one and one half times as wide as vertex; clypeus long and pointed, its sides deeply sinuate; head above clypeus coarsely transversely rugose, with a broad smooth flattened median longitudinal keel. *Thorax* robust; width anteriorly subequal to length (34: 30); maximum width is to length as 50 to 30. Scutellum one fourth wider than long (32: 25), its sides strongly sinuate, its tip long and acute. *Hemielytra:* lobes of membrane unequal, otherwise undistinguished. *Legs:* first pair shortest and raptorial, third pair longest and natatorial, as is usual in Notonecta. Tibia of first pair one fifth longer than the femur, which is strongly incrassate and nearly three times as long as wide at its widest point; tarsus five eighths as long as tibia, the first tarsal joint nearly two and one half times as long as the second (36: 15), claws stout and black. Femur and tibia of second pair subequal in length; tarsus about two thirds as long as the tibia, the first tarsal segment slightly more than twice as long as the second, the claws stout and black; femoral tooth long, stout, blunt; the inner basal angle of the femur bears two long setae, about twice as long as the femoral tooth, and two shorter setae are situated at the extreme apex of the antero-dorsal margin; postero-lateral margin of tibia and first tarsal segment with six or seven long black setae nearly uniformly spaced along its length. Tibia and tarsus of third pair subequal in length; femur two ninths longer than tibia; first tarsal segment twice as long as second, which bears no claws; all the joints are invested with series of small black spines set longitudinally. *Abdomen:* fringing hairs of channel heavy, black; male genital segment prominent, claspers with a group of long spine-like hairs in the middle; male genital capsule and gonapophyses of female (Fig. 1) distinct frome those of other American species, showing near relationship to *Notonecta irrorata* (as has been pointed out by Hungerford [1920, Univ. Kans. Sci. Bull., xi: 331, footnote]).

Color: General coloration luteous, nearly white in fresh specimens, with a dark streak of varying length following the costal margin from the base of the hemielytra; eyes bright brown; scutellum pale yellow; rostrum and legs ivory-white or greenish, the apical segment of the former piceous; underside of the body in general dark or black. Rarely the hemielytra are suffused with black or the scutellum is marked with blackish, or both structures bear dark areas.

Measurements: Head, length, 1.35 mm.; width, 3.5 mm.; front, width, 1.5 mm.; vertex, width, 0.72 mm.; eye, width, 1.2 mm.

Thorax, width at anterior margin, 3 mm.; width at posterior margin, 3.6 mm.; width at humeri, 4.7 mm.; length, 2.72 mm.

Scutellum, width, 3.2 mm.; length, 2.5 mm.

Abdomen, greatest width, 4.9 mm.; length from tip of scutellum to apex of hemielytra, 7.25 mm.

Total length of insect, 13.82 mm. (range, 12.4 to 14.2 mm).

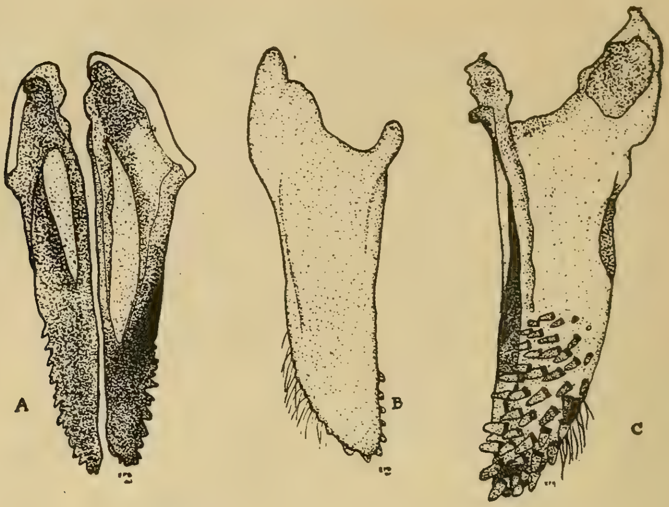
Humeral breadth, 4.7 mm. (range, 4.4 to 5.1 mm.).

Holotype: male, Bearfoot Mts., B. C., 15 : IX : 03.

Paratypes: males and females, topotypic, 15 : IX : 03 and 17 : IX : 03. Males and females, Cheboygan Co., Mich. (Douglas Lake), numerous specimens collected during July and August, 1913 and 1914 (Eva G. Miller); also 5 : VII : 18 to 29 : VIII : 18 (R. F. Hussey and E. P. Butler). Female, Hutchins Lake, S. D., 12 : VII : 22 (H. C. Severin). 3 ♂♂, 1 ♀, Lake Hendricks, S. D., 12 : VII : 22 (H. C. Severin). 1 ♂, 1 ♀, Stony River Camp No. 9, Lake Co., Minnesota, 15 : VIII : 22 (H. B. Hungerford). [Det. by Hungerford.] Female, Maine (Collection Ashley).

Type and paratypes in coll. J. R. de la Torre-Bueno; paratypes in collections of R. F. Hussey, H. B. Hungerford, H. M. Parshley, W. E. Hoffman, and the Museum of Zoölogy, University of Michigan.

Description drawn up under binocular microscope, using 10 × ocular and 55 mm. objective; theoretical magnification, 17. All measurements except total length and width were made with an ocular micrometer.



Description of the Figures.

Fig. 1. Gonapophyses of *Notonecta borealis*, ♀, from three different specimens collected at Douglas Lake, Michigan. *A*, both gonapophyses draw in situ, ventral aspect. *B*, right gonapophysis, bleached with chlorine, median aspect. *C*, right gonapophysis, bleached, lateral aspect.

This striking species belongs to the general group of robust forms typified by *Notonecta irrorata,* to which its genitalia show it to be most nearly allied, but its coloration and its less divergent eyes distinguish it at once from that form. It is similar in aspect to the white specimens of *Notonecta shooterii* Uhler, from which it may be distinguished by the different head, prothorax, and scutellum, and by the larger and stronger spine on the intermediate femur, more remote from its apex than in *shooterii.* The less robust form and smaller head, together with the difference in the femoral spine, suffice to distinguish *borealis* from *Notonecta lutea* Müller.

This species serves to emphasize the well-known hobby of the senior author, namely, the importance of indicating structural characters in describing new species. Here we have three distinct forms answering to the same general color descriptions, and easily defined by the old-time loose structural descriptions. It seems curious that in this genus most descriptions are based upon color alone, and where structures are mentioned at all they are merely alluded to in a very general way.

Notonecta borealis was noted by the junior author to rank next in abundance to *N. undulata* at Douglas Lake, Michigan, in 1918, where it was the only species of the genus whose adults were found commonly before July 20. Its favorite haunts were the partially filled peat bogs, and in some of these it was the most abundant Notonecta found. Its habits are quite similar to those of *N. insulata:* it prefers the open water and is only very rarely taken among vegetation. It is a very alert and wary species.

This form seems to be truly boreal, and extends entirely across the continent. It seems also to be fairly common, judging from the number of specimens we have seen and examined.

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Vol. XVIII OCTOBER, 1923 No. 4

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

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PUBLICATION COMMITTEE

J. R. de la TORRE-BUENO,
Editor

DR. J. BEQUAERT GEO. P. ENGELHARDT

Published by the Society

Price, 35 cents Subscription, $1.50 per year

Mailed October 20, 1923

Entered as second-class matter January 21, 1919, at the postoffice at Lancaster, Pa.,
under the Act of March 3, 1879

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CONTENTS

TABANIDAE OF STATEN ISLAND AND LONG ISLAND, Bequaert and Davis 113
SYNONYMIC NOTES AND NEW GENUS (PHALAENIDAE), Barnes and Benjamin 123
DOLICHOPODIDS IN NEW YORK CITY, Bequaert 126
STUDIES ON THE BLOOD OF INSECTS, Muttkowski 127
RECORDS OF N. J. LEPIDOPTERA, Newark Ent. Soc 136
TAXONOMIC CHARACTERS IN MICROVELIA, Torre-Bueno .. 138
NEW GENUS OF PHORIDAE, Malloch 143
ON SYNOPSES AND KEYS, J. R. T.-B. 145
BOOK NOTE 146

Bulletin of the Brooklyn Entomological Society

Published in

February, April, June, October and December of each year

Subscription price, domestic, $1.50 per year; foreign, $1.75 in advance; single copies 35 cents. Advertising rates on application. Short articles, notes and observations of interest to entomologists are solicited. Authors will receive 25 reprints free if ordered in advance of publication. Address subscriptions and all communications to

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11 North Broadway, White Plains, N. Y.

BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

VOL. XVIII OCTOBER, 1923 No. 4

TABANIDAE OF STATEN ISLAND AND LONG ISLAND, N. Y.

BY J. BEQUAERT AND WM. T. DAVIS.

In 1918 the junior author published a list of 33 species of Tabanidae from Staten Island, and later Mr. Edward J. Burns recorded 5 additional species from the same locality. It has been thought advisable to combine these records with other data available in local collections concerning the occurrence of these flies on both Staten Island and Long Island.

Only the genera *Chrysops, Merycomyia,* and *Tabanus* are thus far known from the area under consideration, the total number of species being 46; of these 40 have been found on Staten Island and 35 on Long Island. The neighboring state of New Jersey possesses 82 known species divided as follows: 1 *Haematopota,* 42 *Tabanus,* 1 *Merycomyia,* 1 *Goniops,* 2 *Pangonius,* 34 *Chrysops,* and 1 *Diachlorus.*

The following revised list of New Jersey tabanids will serve for comparison with the species listed from Staten Island and Long Island. It is compiled from Prof. J. B. Smith's New Jersey list of 1910, and later records in various entomological journals. *Chrysops hilaris* is here for the first time recorded from that state. The star indicates species we ourselves have not seen from New Jersey.

* *Haematopota punctulata* Macquart
* *Tabanus abdominalis* Fabricius
Tabanus americanus Forster
Tabanus astutus Osten Sacken
Tabanus atratus Fabricius
Tabanus bicolor Wiedemann
Tabanus carolinensis Macquart

Tabanus cinctus Fabricius
Tabanus coffeatus Macquart
* *Tabanus conterminus* Walker
Tabanus costalis Wiedemann
Tabanus daeckei Hine
Tabanus epistates Osten Sacken
* *Tabanus exul* Osten Sacken
* *Tabanus flavus* Macquart (= *T. mexicanus* of authors)
Tabanus fulvulus Wiedemann
Tabanus giganteus De Geer
Tabanus gracilis Wiedemann
Tabanus hinei Johnson
Tabanus lasiophthalmus Macquart
Tabanus lineola Fabricius
* *Tabanus longus* Osten Sacken
Tabanus melanocerus Wiedemann
Tabanus microcephalus Osten Sacken
* *Tabanus molestus* Say
Tabanus nigrescens Palisot de Beauvois
Tabanus nigrovittatus Macquart
Tabanus nivosus Osten Sacken
Tabanus ohioensis Hine (hardly distinct from *T. bicolor* Wiedemann)
Tabanus orion Osten Sacken
Tabanus pumilus Macquart
Tabanus recedens Walker
* *Tabanus reinwardtii* Wiedemann
Tabanus sagax Osten Sacken
Tabanus sparus Whitney
* *Tabanus stygius* Say
Tabanus sulcifrons Macquart (hardly distinct from *abdominalis* Fabricius)
Tabanus superjumentarius Whitney
Tabanus trimaculatus Palisot de Beauvois
Tabanus trispilus Wiedemann
* *Tabanus typhus* Whitney
Tabanus vivax Osten Sacken
* *Tabanus zonalis* Kirby
Merycomyia whitneyi (Johnson)
* *Goniops chrysocoma* (Osten Sacken)
* *Pangonius piger* Osten Sacken
* *Pangonius rasus* Loew
* *Chrysops amazon* Daecke
Chrysops bistellata Daecke
Chrysops brimleyi Hine

Chrysops brunnea Hine
Chrysops callida Osten Sacken
Chrysops carbonaria Walker
Chrysops celer Osten Sacken
Chrysops cuclux Whitney
Chrysops cursim Whitney
Chrysops delicatulus Osten Sacken
Chrysops dimmocki Hine
Chrysops excitans Walker
Chrysops fallax Osten Sacken
Chrysops flavida Osten Sacken
* *Chrysops frigida* Osten Sacken
Chrysops fulvistigma Hine
Chrysops hilaris Osten Sacken. Runyon (Wm. T. Davis Coll.)
Chrysops hinei Daecke
Chrysops inda Osten Sacken
Chrysops lugens Wiedemann and var. *morosa* Osten Sacken
* *Chrysops mitis* Osten Sacken
Chrysops moecha Osten Sacken
* *Chrysops montana* Osten Sacken
Chrysops nigra Macquart
Chrysops nigribimbo Whitney
Chrysops obsoleta Wiedemann
Chrysops parvula Daecke
Chrysops plangens Wiedemann
Chrysops pudica Osten Sacken
Chrysops sackeni Hine
Chrysops sequax Williston
Chrysops striata Osten Sacken
Chrysops univittata Macquart
Chrysops vittata Wiedemann
* *Diachlorus ferrugata* (Fabricius)

In the vicinity of Washington, D. C., McAtee and Walton (1918) list 55 species of this family (31 *Tabanus,* 1 *Merycomyia,* 1 *Goniops,* 2 *Pangonius,* 19 *Chrysops,* 1 *Neochrysops*). While farther south, in North Carolina, C. S. Brimley and F. Sherman (1904, 1908, and 1922) have recorded 70 species (41 *Tabanus,* 1 *Diachlorus,* 28 *Chrysops*).

Undoubtedly some of the New Jersey species not mentioned in the present account will eventually be captured on Staten Island or on Long Island; but there are others which are not likely to occur there. *Tabanus astutus, T. zonalis, Pangonius piger, P. rasus, Chrysops frigida,* and *C. mitis* are more northern in their range and are only found in the mountainous portions of New Jersey. On the other hand, *Tabanus flavus, T. americanus, T. gracilis, T. longus, T. fulvulus, Goniops chrysocoma, Chrysops bistellata,* and *Diachlorus ferrugatus* are southern species which can hardly reach the vicinity of New York City.

The Tabanidae have always been a favorite family among students of Diptera. They are so aggressive, for the most part, that the entomologist acts as his own bait for many species of *Tabanus* and *Chrysops*. A tame cow is, however, the best of subjects about which to collect. These flies are also attracted by any dark-colored object like an open umbrella lying on the ground and a number of specimens have been thus taken. July 11, 1911, was a very warm day and a horse that was pulling a load of shingles through the hot pine woods at Chatsworth, New Jersey, died by the wayside. Many hours later horseflies of several species were still paying attention to the remains and sucking what they could of the animal's blood.

Some of the flies mentioned in this paper were first identified by the late V. A. E. Daecke. Later Mr. Charles W. Johnson examined others, and in December, 1916, Professor James S. Hine examined all the specimens that had been collected up to that time, and he has also recently identified some difficult specimens.

TABANINAE.

1. *Tabanus atratus* Fabricius.

STATEN ISLAND: common (Ds. Coll.); Richmond; Ft. Wadsworth; Watchogue (E. J. Burns Coll.). LONG ISLAND: Brooklyn (G. P. Engelhardt Coll.); Flatbush; Rosedale (F. M. Schott Coll.); Wading River; Long Pond, Wading River (Ds. Coll.); Massepequa; Long Beach (J. B. Coll.).

On June 24, 1906, a female was found depositing her eggs upon a plant stem on the salt meadows near the Fresh Kill bridge, Staten Island. The eggs are pure white when deposited. The pupae have also been found by us, protruding from the ground in wet places, and the imagoes have been reared.

2. *Tabanus bicolor* Wiedemann.

STATEN ISLAND: Watchogue, June 29, 1919 (E. J. Burns Coll.). LONG ISLAND: Wading River; Montauk, August 24, 1917 (Ds. Coll.).

T. ohioensis Hine is hardly separable from this.

3. *Tabanus cinctus* Fabricius.

STATEN ISLAND: one male, June 25 (Ds. Coll.). LONG ISLAND: Yaphank (G. P. Engelhardt Coll.); Kings Park (E. L. Bell Coll.); Babylon (Brooklyn Museum).

4. *Tabanus coffeatus* Macquart.

STATEN ISLAND: Clove Valley (Ds. Coll.); Watchogue (E. J. Burns Coll.). LONG ISLAND: Wading River (G. P. Engelhardt Coll.).

5. *Tabanus costalis* Wiedemann.

STATEN ISLAND: (Ds. Coll.); Richmond; Watchogue; Fort Wadsworth (E. J. Burns Coll.). LONG ISLAND: Jamaica (C. E. Olsen Coll.).

6. *Tabanus daeckei* Hine.

STATEN ISLAND: carried as prey to its nest by a female *Bembix spinolae* Lepeletier, July 2, 1916 (J. B. Coll.). Named by Prof. J. S. Hine.

7. *Tabanus epistates* Osten Sacken.

STATEN ISLAND: Huguenot (Ds. Coll.). LONG ISLAND: vicinity of Brooklyn (G. P. Engelhardt Coll.).

8. *Tabanus giganteus* De Geer.

STATEN ISLAND: Annadale, etc. (Ds. Coll.); Huguenot (E. J. Burns Coll.). LONG ISLAND: vicinity of Brooklyn (G. P. Engelhardt and C. Schaeffer Coll.).

9. *Tabanus hinei* Johnson (= *Therioplectes politus* Johnson).

STATEN ISLAND: (Ds. Coll.); Richmond; Watchogue (E. J. Burns Coll.). LONG ISLAND: Long Pond, Wading River (Ds. Coll.).

10. *Tabanus lasiophthalmus* Macquart.

STATEN ISLAND: common; Tottenville; Richmond; etc. (Ds. Coll.); Watchogue (E. J. Burns Coll.). LONG ISLAND: Montauk; Wyandanch (F. M. Schott Coll.); Wading River; Gardiner's Island (Ds. Coll.); Jamaica (A. Nicolay Coll.).

A male of this species was bred, May 29, 1900, from a pupa found underneath the bark of a tree at Fort Lee, N. J.

11. *Tabanus lineola* Fabricius.

Staten Island: common (Ds. Coll.; E. J. Burns Coll.). Long Island: Prospect Park, Brooklyn; Flatbush (G. P. Engelhardt Coll.); Jamaica; Yaphank; Aqueduct (Ds. Coll.); Orient; Long Beach (J. B. Coll.); Sands Point (E. J. Burns Coll.); Wading River (F. M. Schott Coll.).

12. *Tabanus nigrescens* Palisot de Beauvois.

Staten Island: a female from Watchogue, August 4; another female found dead on Richmond Turnpike near Silver Lake, August 10 (Ds. Coll.); a male from Watchogue, July 21, 1920 (E. J. Burns Coll.).

13. *Tabanus nigrovittatus* Macquart.

Staten Island: common on the beaches (Ds. Coll.); Watchogue (E. J. Burns Coll.). Long Island: Rosedale (F. M. Schott Coll.); Orient; Maspeth (Ds. Coll.); Rockaway Beach (C. E. Olsen Coll.); Long Beach; Gardiner's Island (J. B. Coll.); Sands Point (E. J. Burns Coll.).

This is the well-known "green-head," which is very troublesome on bathing beaches during the summer.

Daecke (Ent. News, XIX, 1908, p. 496) records having captured *Bembix spinolae* with *Tab. nigrovittatus* in its grasp.

14. *Tabanus orion* Osten Sacken.

Staten Island: Clove Valley, one female and two males; on railroad train, Richmond, August 13, 1920 (Ds. Coll.); Oakwood, July 24, 1920 (E. J. Burns Coll.). Long Island: vicinity of Brooklyn (G. P. Engelhardt Coll.).

15. *Tabanus pumilus* Macquart.

Staten Island: common (Ds., J. B., and E. J. Burns Coll.). Long Island: Rosedale (F. M. Schott Coll.); Pennyquid Barrens (J. B. Coll.).

16. *Tabanus recedens* Walker.

Staten Island: (Ds. Coll.); Watchogue (E. J. Burns Coll.).

17. *Tabanus reinwardtii* Wiedemann.

Staten Island: one male, July 24 (Ds. Coll.).

18. *Tabanus sparus* Whitney.

Staten Island: (Ds. Coll.). Long Island: Queens (F. M. Schott Coll.); Riverhead (Ds. Coll.).

19. *Tabanus stygius* Say.

Long Island: Yaphank, August 16, 1921 (G. P. Engelhardt Coll.).

20. *Tabanus sulcifrons* Macquart.

Staten Island: Watchogue; Arlington (E. J. Burns Coll.); Richmond (Miss Miriam Campbell Coll.).

21. *Tabanus superjumentarius* Whitney.

Staten Island: Richmond, July 13, 1919 (E. J. Burns Coll.).

22. *Tabanus trimaculatus* Palisot de Beauvois.

Staten Island: female and male, June 27, 1919 (Ds. Coll.); Richmond, July 17, 1920 (E. J. Burns Coll.). Long Island: vicinity of Brooklyn (C. Schaeffer Coll.).

23. *Tabanus trispilus* Wiedemann.

Staten Island: (Ds. Coll.). Long Island: Queens (F. M. Schott Coll.).

24. *Merycomyia whitneyi* (Johnson).

Staten Island: Clove Valley (C. L. Pollard Coll.).

Pangoniinae

25. *Chrysops brimleyi* Hine.

Staten Island: Woodrow, June 22, 1907 (Ds. Coll.); Watchogue (E. J. Burns Coll.).

26. *Chrysops callida* Osten Sacken.

Staten Island: Grymes Hill; Prince's Bay; Clove Valley; Richmond; Watchogue (Ds. Coll.); Tottenville; Fort Wadsworth (E. J. Burns Coll.). Long Island: North Beach woods; Glendale (F. M. Schott Coll.); Riverhead; Yaphank; Long Pond, Wading River (Ds. Coll.); Orient; Gardiner's Island (J. B. Coll.); Rockaway Beach (C. Schaeffer Coll.).

27. *Chrysops carbonaria* Walker (= *C. fugax* Osten Sacken).

Staten Island: Richmond (Ds. Coll.). Long Island: Yaphank (Ds. Coll.); Farmingdale (J. B. Coll.).

28. *Chrysops celer* Osten Sacken.

STATEN ISLAND: common (Ds. Coll.); Richmond (J. E. Burns Coll.). LONG ISLAND: Yaphank; Deep Pond, Wading River; Central Park (Ds. Coll.); Cold Spring Harbor (J. B. Coll.).

29. *Chrysops cursim* Whitney.

LONG ISLAND: Riverhead (Ds. Coll.).

30. *Chrysops delicatula* Osten Sacken.

LONG ISLAND: Wyandanch; Riverhead; Wading River (Ds. Coll.). At Long Pond, Wading River, a female was taken as the prey of *Asilus flavofemoratus* Hine.

31. *Chrysops dimmocki* Hine.

STATEN ISLAND: Tottenville; Great Kills; Reed's Valley; Richmond (Ds. Coll.); Fort Wadsworth; Watchogue (E. J. Burns Coll.). LONG ISLAND: Orient; Riverhead; Yaphank; Wading River; Wyandanch (Ds. Coll.).

32. *Chrysops fallax* Osten Sacken.

STATEN ISLAND: Clove Valley (Ds. Coll.); Richmond (E. J. Burns Coll.). LONG ISLAND: Cold Spring Harbor (American Museum of Natural History); Wyandanch (C. Schaeffer Coll.).

33. *Chrysops flavida* Wiedemann.

STATEN ISLAND: common; Kreischerville; Lake's Island; etc. (Ds. Coll.); Watchogue; Tottenville; Fort Wadsworth (E. J. Burns Coll.). LONG ISLAND: Flatbush; Rosedale (F. M. Schott Coll.); Half Way Hollow Hills; Hills between Flanders and East Quogue; Riverhead; Yaphank; Wading River; Wyandanch (Ds. Coll.); Orient; Gardiner's Island (J. B. Coll.); Jamaica (C. Schaeffer Coll.).

34. *Chrysops inda* Osten Sacken.

STATEN ISLAND: (Ds. Coll.); Watchogue (E. J. Burns Coll.).

35. *Chrysops lugens* Wiedemann and var. *morosa* Osten Sacken.

LONG ISLAND: Wading River (Ds. Coll.); Cold Spring Harbor (J. B. Coll.).

36. *Chrysops moecha* Osten Sacken.

STATEN ISLAND: Richmond, July 12, 1919; Watchogue (E. J. Burns Coll.).

37. *Chrysops montana* Osten Sacken.

STATEN ISLAND: Clove Valley (Ds. Coll.); Fort Wadsworth (E. J. Burns Coll.). LONG ISLAND: Riverhead; Long Pond, Wading River (Ds. Coll.); Orient (J. B. Coll.); Newtown (C. Schaeffer Coll.).

38. *Chrysops niger* Macquart.

STATEN ISLAND: common; Clove Valley; Richmond; Tottenville; etc. (Ds. Coll.); Watchogue; New Dorp (E. J. Burns Coll.). LONG ISLAND: Yaphank (Ds. Coll.); Maspeth (C. E. Olsen Coll.).

39. *Chrysops nigribimbo* Whitney.

LONG ISLAND: Yaphank; Riverhead (Ds. Coll.); Queens (F. M. Schott Coll.); Wading River (J. E. Burns Coll.).

40. *Chrysops obsoleta* Wiedemann.

STATEN ISLAND: Watchogue; Clove Valley (Ds. Coll.); Kreischerville; New Dorp; Richmond (E. J. Burns Coll.). LONG ISLAND: Wyandanch (F. M. Schott Coll.); Cold Spring Harbor (American Museum of Natural History).

41. *Chrysops plangens* Wiedemann.

STATEN ISLAND: common; Watchogue; Richmond; etc. (Ds. Coll.). LONG ISLAND: Rosedale (F. M. Schott Coll.); Wading River; Nissequogue (Ds. Coll.); Sands Point (E. J. Burns Coll.); Long Beach (J. B. Coll.).

At Long Beach females of this species were visiting the flowers of *Chrysanthemum leucanthemum* and also biting man.

42. *Chrysops pudica* Osten Sacken.

STATEN ISLAND: (Ds. Coll.).

43. *Chrysops sackeni* Hine.

LONG ISLAND: a male, named by Prof. Hine (American Museum of Natural History).

44. *Chrysops striata* Osten Sacken.

STATEN ISLAND: Clove Valley; Watchogue (Ds. Coll.). LONG ISLAND: Long Pond, Wading River; Riverhead (Ds. Coll.).

45. *Chrysops univittata* Macquart.

STATEN ISLAND: common; Watchogue; Richmond; Clove Valley; etc. (Ds. Coll.); Fort Wadsworth (E. J. Burns Coll.). LONG ISLAND: Half Way Hollow Hills; Wading River; south of Smithtown; Riverhead; Yaphank; Wyandanch (Ds. Coll.).

46. *Chrysops vittata* Wiedemann.

STATEN ISLAND: Tottenville (J. B. Coll.); Buck's Hollow; Richmond; Watchogue; Eltingville; Great Kills (Ds. Coll.); Arlington; Huguenot; Fort Wadsworth (E. J. Burns Coll.). LONG ISLAND: Oakdale; Wyandanch (F. M. Schott Coll.); Yaphank; Riverhead (Ds. Coll.); Cold Spring Harbor; Gardiner's Island (J. B. Coll.).

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Smith, John B. 1910. Catalogue of the insects of New Jersey.

Wanted.—Short notes on food plants, localities, etc., from 3 to 20 lines long.

—*Editor.*

SYNONYMIC NOTES WITH THE DESCRIPTION OF A NEW GENUS.

(*Lepid., Phalaenidae* (=*Noctuidae*), *Hadeninae.*)

By Wm. Barnes and F. H. Benjamin, Decatur, Ill.

Trichopolia Grote.

Type *T. dentatella* Grote.

1883, Grt., Pap., III, 76, two species placed in genus; *dentatella,* and *ptilodonta* questionably.

1895, Grt., Abh. Nat. Ver. Bremen, XIV, 81, type designated *T. dentatella.*

1905, Hamp., Cat. Lep. Phal. B. M., V, 361, type designated *T. dentatella.*

Eupolia Smith.

Type *E. licentiosa* Smith.

1894, Sm., Trans. Amer. Ent. Soc., XXI, 69; p. 70 *licentiosa* sole species and therefore type.

1909, Hamp., Cat. Lep. Phal. B. M., VIII, 544, *licentiosa* designated type; but erroneously placed as Sect. I of *Namangana.*

dentatella Grote.

1883, Grt., Pap., III, 76, *Trichopolia.*

1893, Sm., Bull. U. S. N. M., XLIV, 164, *Trichopolia.*

1895, Grt., Abh. Nat. Ver. Bremen, XIV, 81, *Trichopolia.*

1902, Dyar, Bull. U. S. N. M., LII, 161, No. 1947, *Trichopolia.*

1905, Hamp., Cat. Lep. Phal. B. M., V, 362, pl. LXXXVIII, f. 16, *Trichopolia.*

1917, B. & McD., Check List, p. 53, No. 1867, *Trichopolia.*

obtusa Smith.

1887, Sm., Proc. U. S. N. M., X, 474, *Taeniocampa.*

1893, Sm., Bull. U. S. N. M., XLIV, 204, *Taeniocampa.*

1895, Grt., Abh. Nat. Ver. Bremen, XIV, 91, *Graphiphora.*

1902, Dyar, Bull. U. S. N. M., LII, 166, No. 2028, *Graphiphora.*

1905, Hamp., Cat. Lep. Phal. B. M., V, 300, *Eriopyga.*

1917, B. & McD., Check List, p. 53, No. 1867 syn., *dentatella, Trichopolia.*

licentiosa Smith.

1894, Sm., Trans. Am. Ent. Soc., XXI, 70, pl. III, f. 8, *Eupolia.*
1902, Dyar, Bull. U. S. N. M., LII, 161, No. 1949, *Eupolia.*
1903, Holl., Moth Book, p. 199, text fig. 109, *Eupolia.*
1909, Hamp., Cat. Lep. Phal. B. M., VIII, 545; p. 546, text fig. 152, *Namangana* (*Eupolia*).
1917, B. & McD., Check List, p. 68, No. 2617, *Namangana.*

The unique types of *dentatella* and *obtusa,* and the male type of *licentiosa,* are before the authors through the kindness of Messrs. Engelhardt and Doll. The authors have examined and matched the female type of *licentiosa* in the National Museum. All of these types represent a single species, which is not uncommon from Utah to Arizona and westward through the Californian desert region.

Dr. Smith failed to see the hair on the eyes of the types of *licentiosa,* which caused him to erect the genus *Eupolia* and describe *licentiosa,* although he had already redescribed *Trichopolia dentatella* as *Taeniocampa obtusa.* Sir George Hampson had no specimens of *dentatella* and drew his characterization of the genus *Trichopolia* from a specimen of *ursina* furnished by Dr. Barnes. A redescription of *Trichopolia* is, therefore, advisable.

> Proboscis normal, functional; palpi obliquely upturned, reaching the vertex, scaled, first and second joints fringed with some hair-like scales below, third joint smoothly scaled, somewhat more oblique; frons scarcely rounded out but somewhat roughened, not smooth and shining, with a corneous plate below; eyes normal, rounded, hairy, lashed from behind only; antennae of male heavily bipectinate to near tip, the extremity serrate; of female simple, ciliated; head and thorax clothed chiefly with broad scales, patagia with some hair intermixed with the scales; pro- and meta-thorax with small crests; tibiae rather heavily clothed with hair-like scales, without spines or claws; abdomen with a well-developed dorsal crest on first segment, on fresh specimens a slight crest on second segment, but without strong lateral fringes of hair; fore wing rather narrow, veins 3 from near angle of cell, 4 from angle, 5 from above angle, 6 from upper angle, 9 from 10 anastomosing with 7 and 8 to form the areole; hind wing with veins 3, 4 from angle of cell, 5 obsolescent from middle of discocellulars, 6, 7 connate or slightly stalked from upper angle, 8 anastomosing with the cell near base only.

Trichopolia comes very close to being a *Scotogramma* with pectinate antennae, but the front is not as much rounded out. It is also closely related to *Polia* and some species of *Eriopyga.* Most of these hairy-eyed genera need careful study to ascertain which should be retained and what species to place in them. Tentatively the best place for *Trichopolia* seems between *Admetovis* and *Lophoceramica.* This placement between *Trichoclea* and *Chabuata* brings *Trichopolia* into contact with its obvious exotic affinities, which possess pectinate antennae in the male sex, such as *Hydroeciodes,* with which it agrees in possessing similar narrow primaries.

This placing of *Trichopolia* leaves *ursina* apparently with no available generic name. It seems advisable, therefore, to erect and characterize the following genus.

Engelhardtia gen. nov.

Type *Engelhardtia ursina* (Smith) = *Trichopolia ursina* (Smith) = *Lathosea ursina* Smith.

Proboscis aborted, minute; palpi short, porrect to beyond frons, fringed with long hair; frons somewhat rounded out, roughened, with a corneous plate below the frons laterally produced; eyes moderate, somewhat constricted, very hairy, and overhung by very long cilia from behind with moderate cilia from near the base of the antennae; antennae of male bipectinate, the cephalic pectinations longer than the caudal pectinations, serrate at base and extremity, the pectinations and serrations at right angles to the shaft and heavily fasciculate with cilia; of female, lamellate and ciliated; head and thorax clothed with long hair and without definite crests; tibiae hairy, without spines or claws; tarsi heavily spined; abdomen without crests, a slight patch of dorsal hair on the first segment as a fringe rather than a true crest, and with strong lateral fringes of long hair; fore wing rather narrow, the apex produced and the termen obliquely curved; veins 3 from near angle of cell, 4 from angle, 5 from slightly above angle, 6 from upper angle, 9 from 10 anastomosing with 7, 8 to form the areole, 11 from cell; hind wings with veins 3, 4 from angle of cell, 5 obsolescent from about one third below middle of discocellulars, 6, 7 stalked, 8 anastomosing with the cell near base only; beneath, secondaries with a heavy black spot on the discocellular vein connected to the base of the wing by a black bar through the center of the cell.

The present genus shows no affinity to any described genera of the Hadeninae and a rearrangement of the genera of the various subfamilies will probably place it as a hairy-eyed genus of the Cuculliinae, a position which it can not now occupy in a scheme of classification based on single characters determining into which subfamily an insect must be placed. Its obvious relatives are *Lathosea* and *Rancora,* with which it agrees in habitus, wing-shape, roughened frons, antennae, ciliated eyes, and somewhat in type of vestiture, combined with the black spot and bar on the under side of the secondaries, a character which the authors have already shown may be used to separate *Lathosea* and *Rancora* from *Cucullia* (see B. & Benj., Contr. Nat. Hist. Lep. N. A., V, No. 1, 28–29, 1922). It differs abundantly from *Lathosea* by possessing hairy eyes, vestiture of hair instead of hair-like scales on the thorax, and in that the tongue is aborted and minute, and the abdomen without true dorsal crests. The tegulae are probably seldom erected to form a hood; although those of *Lathosea* are often erected, contrary to Hampson's characterization, which is also erroneous in that *Lathosea* possesses a somewhat roughened frons (see Hamp., Cat. Lep. Phal. B. M., VI, 205, 1906).

Some Curious Dolichopodids (Dipt.) in the Vicinity of New York City.—The genus *Tachytrechus,* recently reviewed by Mr. C. T. Greene (Proc. U. S. Nat. Mus., LX, No. 17, 1922, pp. 1–21, Pl. I), is remarkable, even among the Dolichopodidae, for its secondary male sexual characters, such as a maculation in the apex of the wing, the lamella-bearing antennal arista, deformations of the legs, etc. It is well represented in the eastern United States. Mr. Greene records from New Jersey *T. rotundipennis* Greene, *T. vorax* Loew, *T. binodatus* Loew, *T. laticrus* Van Duzee, and *T. protervus* Melander. From New York State he mentions only *T. binodatus* Loew and *T. moechus* Loew. I have seen thus far two species from the vicinity of New York City: *T. vorax* Loew, collected by Mr. E. J. Burns at Wading River, Long Island, N. Y., September 1, 1919; and *T. moechus* Loew, which I have taken at West Nyack, N. Y., July 12, 1920. Related to these is *Liancalus genualis* Loew, one of the largest American members of the family, the males of which are very peculiar on account of the beaded and spotted tip of the wing; Mr. Burns and I have taken it in numbers on moist rocks at the Palisades, N. J., opposite New York City, during July, 1921.—J. BEQUAERT.

STUDIES ON THE BLOOD OF INSECTS.

I. THE COMPOSITION OF THE BLOOD.*

BY R. A. MUTTKOWSKI, Moscow, Idaho.

1. Introductory.
2. Reaction and Volume.
3. Color.
4. Chemical Composition.
5. Bibliography.

1. *Introductory.*

In studying the blood of insects in connection with respiration and coagulation or clotting, the writer found it necessary to make rather extensive studies of the various structural elements of the blood and the composition of the plasma. Certain phases pertaining to respiration have been published in part (1921). In this paper some of the results on the composition of the plasma are presented, intended as a preliminary report on the subject, since the investigations are far from complete. To summarize our knowledge on this topic, I have included the results of other investigators, crediting these at the respective places.

I am indebted to the Research Information Service of the National Research Council, to Dr. Wm. S. Marshall of the University of Wisconsin, and to Mr. Chancey Juday of the Wisconsin Geological and Natural History Survey for various bibliographical information. Their courtesy is hereby acknowledged gratefully.

2. *Reaction and Volume.*

The reaction of insect blood is slightly alkaline (Miall and Denny, 1883) or neutral to moist litmus paper. In *Leptinotarsa, Dytiscus,* and *Hydrophilus,* for instance, it is neutral to litmus in the adults, alkaline in the larvae; but distinctly alkaline in the adults to more sensitive indicators and various stains, such as hematoxylin and methyl violet. After death, or even before, the blood changes to acid. Thus, the blood of sluggish *Enallagma* and *Aeshna,* specimens so weak that they barely moved a leg, was found to be distinctly acid to litmus paper and Congo red. The

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(* Contribution from the Zoölogical Laboratory of the University of Idaho, Moscow, Idaho.)

acidity is probably due to the large amount of carbonates in solution or gathered in loose saccules, which crystallize out spontaneously on exposure to the air. This acidity increases markedly a few hours after death.

To the touch insect blood is very viscid and gelatinous. This is due to the gelatin and fibrinogen present and perhaps to some extent to the albumins and globulins. The viscosity increases greatly with the alkalinity. To the taste somewhat diluted blood is distinctly salty, although occasionally bitter, or even acrid.

The volume of the blood varies according to the stage of life (Landois, 1864) and the period of feeding. It is greatest in the pre-pupal period in holometabola, or the pre-imaginal period in hemimetabola, and smallest, proportionately, in adults. In Vertebrates the approximate proportion is about one volume of corpuscles to two volumes of plasma. In five c.c. of centrifuged oxalated blood taken from full-grown but starved *Leptinotarsa* larvae, the bulk of corpuscles formed about one eightieth of the total, hence a proportional relation of approximately one fortieth, since the oxalate solution formed half of the volume. In fully fed specimens the proportion is even less, about one sixtieth, while in adults the number of corpuscles is decreased so markedly that an estimate of one one-hundredth does not seem exaggerated. It is difficult to make numerical counts, since the gelatin and almost immediate fibrin formation prevent thorough mixing with the usual fluids.

After feeding the volume of plasma increases greatly, distending the haemocoel, so that larvae appear turgid. If starved, the integument becomes flaccid and wrinkled, indicating a decrease in volume of plasma. There is no decrease, however, in the number of corpuscles, as indicated by the experiments noted. The volume of plasma appears to have little relation to growth or transformation. I have kept *Leptinotarsa* larvae for two weeks, until they were shriveled to apparently half their normal size. They pupated and emerged practically full sized, this despite the plausible assumption that with the loss of plasma a portion of the reserve food supply had been used up in the period of starvation.

3. *Color of the Blood.*

As a rule, the blood has some slight tinge of color. I have found the blood clear, slightly tinged with yellow, yellow, orange,

orange-red, red, bluish, blue-green, and deep green, confirming the colors found by various investigators. The following list shows the colors in a number of insects examined personally, together with the type of food eaten:

NAME.	STAGE.	COLOR OF BLOOD.	TYPE OF FOOD.
Perloidea			
Pteronarcys sp.	larva	orange-red	mixed
Pteronarcys sp.	adult	orange-red	nectar
Acroneura sp.	nymph	yellow	animal
Acroneura sp.	adult	yellow	??
Ephemeroidea			
Ephemera sp.	nymph	clear	mixed
Mountain species	nymph	red	mixed
Odonata			
Enallagma sp.	nymph	green	animal
Ischnura sp.	nymph	blue-green	mixed
Aeshna sp.	nymph	green	animal
Anax sp.	nymph	green	animal
Libellula sp.	nymph	green	animal
Hemiptera			
Notonecta sp.	nymph	green	animal juices
Notonecta sp.	adult	yellowish	animal juices
Gerris sp.	adult	yellow	animal juices
Belostoma sp.	nymph	green	animal juices
Belostoma sp.	adult	greenish	animal juices
Orthoptera			
		yellow	
Ceuthophilus sp.	adult	yellow	mixed
Gryllus sp.	adult	faint yellow	plant
Locustidae spp.	adults	clear, yellowish	plant
Microcentrum sp.	nymphs	yellowish	plant
Trichoptera			
Phryganea sp.	larva	clear	plant
Leptocerus sp.	larva	yellow	mixed
Lepidoptera			
Mamestra sp.	adult	clear	nectar
Clisiocampa sp.	larva	green	plant
Deilephila sp.	larva	green	plant
Pieris rapae	larva	green	plant
Cossus sp.	larva	yellow	wood
Samia cecropia	adult	clear	nectar

Coleoptera			
Calosoma sp.	adult	yellowish	animal
Dytiscus sp.	larva	green	animal juices
Dytiscus sp.	adult	greenish, clear	animal
Hydrophilus sp.	larva	yellow, orange	animal
Hydrophilus sp.	adult	yellow	animal
Thermonectes sp.	larva	yellowish, greenish	animal
Thermonectes sp.	adult	yellow	animal
Tenebrio sp.	larva	yellow	mixed
Tenebrio sp.	adult	bright yellow	mixed
Coccinellidae spp.	adults	yellow	plant
Prionus sp.	larva	yellow	wood
Prionus sp.	adult	yellow	wood
Trogoderma sp.	larva	clear	dry food
Leptinotarsa sp.	larva	orange, orange-red	plant
Leptinotarsa sp.	adult	orange	plant
Diptera			
Calliphora sp.	adult	clear	micro-food
Musca sp.	larva	yellowish	mixed
Eristalis sp.	larva	clear	micro-food
Odontomyia sp.	larva	greenish	micro-food
Stratiomyia sp.	larva	greenish	micro-food
Miastor sp.	adult	clear	flesh
Chironomus sp.	larva	red	micro-food
Protenthes sp.	larva	clear, bluish	micro-food
Various blood-sucking flies	adult	red	animal
Hymenoptera			
Tenthredo sp.	larva	faint green	plant
Vespa sp.	adult	clear	plant
Bombus sp.	adult	clear	plant

The foregoing list could be extended greatly; but my purpose is to show only the variation of color within a few of the orders. It is evident from the table that there is no correlation between the color of the blood of a species and the type of food eaten. All shades may be found in both herbivorous and carnivorous species. Of particular interest is the fact that the blood of adults is lighter in color than that of the larvae; in *Hydrophilus* and *Dytiscus* it even differs in color in the stages—greenish in the larvae, yellow or bright orange in the adults. Geyer (1913) also noted some sexual differences in certain moths, the blood of the males being clear or faintly tinged, that of the females brightly colored (*Bombyx mori, Xanthia flavago*). Geyer associates this difference with the pigmentation of the eggs. A similar difference exists in the sexes of *Dytiscus,* the female blood being bright orange, that of the males clear yellow.

Much confusion exists as to the identity of the various pigments, due in part to confusion in terminology. Palmer (1922) has recently called attention to the fact that often the same name was given to different substances or different names to identical substances. Czapek (1913) proposed the name of " chromolipoids " for all fat-soluble plant and animal pigments, which would include many insect pigments, particularly the greens, yellows, and reds, which are usually known as lipochromes and regarded as derived chlorophylls and xanthophylls. Tswett (1911) has shown that many plant and animal pigments are closely related, if not identical, and proposed the group name " carotinoids " for pigments of this type, with " carotins " and " xanthophylls " as the main subdivisions. As such " carotinoids " many of the larval pigments, especially of herbivorous larvae, must be regarded.

But Hopkins, Urech, and A. G. Mayer (1896, 1893, 1897) have demonstrated that similar pigments, namely, reds, yellows, orange, and some whites, in adult Lepidoptera are uric acid derivatives and therefore non-carotinoid. Hemoglobin, too, and hemocyanin are non-carotinoid. On the other hand, in adults of certain Coleoptera and Hemiptera the pigments have been shown to be carotinoids. At best, therefore, no generalizations are possible. Unfortunately, from the various studies it is not clear if whole specimens were used in the extraction of the pigments, or the blood alone. On the contrary, in a number of instances large quantities of whole specimens are specifically mentioned as used for extraction. Yet it is a fact that the pigments as deposited in the wings or epidermis, although originating from the blood, are elaborated substances of more complex composition, and hardly identical with those in solution in the blood. This is clearly shown by the studies on Lepidoptera. The *separate* study of the blood pigments and of the " fixed " pigments of wings and exoskeleton should materially affect our knowledge. The whole subject needs much investigation, particularly among carnivorous insects. For some reason these have been almost entirely neglected in pigment studies, although it appears to me that we should derive more accurate information from them as to the nature of insect pigments than from herbivorous species.

4. *Chemical Composition.*

Occasionally one finds crystals in drying blood, but only when the plasma is supersaturated with the crystallizing substance, as, for instance, triple phosphate in *Leptinotarsa* blood, or calcium sulphate in certain caterpillars. Ordinarily, however, the blood is in a " balanced " or " organized " condition and substances do not crystallize out spontaneously. Only a few crystals of calcium carbonate are nearly always to be found. There is a difference in dead insects, for here the blood is " disorganized," and one may find various crystals in abundance, chiefly carbonates, triple phosphates, and tyrosin, or, more rarely, oxalate and sodium chloride crystals, or products of protein decomposition such as histidine and leucine. In general, however, little information is to be obtained from spontaneous crystallization as to the constituents of the plasma. I found direct testing with reagents, ashing, and micro-distillation and sublimation satisfactory. For testing the blood was strongly diluted with distilled water, centrifuged, and the supernatant liquid concentrated by mild heat, not to exceed 40° C. The centrifuging removes the corpuscles and some fibrin and gelatin, but otherwise leaves the plasma intact.

Insect blood, like that of Vertebrates, is composed of corpuscles and plasma. Certain investigations on the corpuscles are to be treated in a separate paper; the corpuscles are therefore omitted in this study. The plasma contains serum, gelatin, fibrinogen, and various substances in solution. The last can be conveniently classified as water, gases, salts, foods—namely, the proteins, fats, and sugars—pigments, respiratory proteins, waste products, enzymes, and special substances.

The presence of water is evident from clotting, ashing, and starvation experiments. Its proportion is difficult to ascertain, but from the reduction in size of a drop of blood during drying the water should form fully three fourths of the plasma. Of gases, oxygen, nitrogen, and carbon dioxide are always present, although the latter should be regarded as a waste product. The oxygen may be in solution in the plasma, but more probably the larger part of it is bound to a respiratory protein—hemocyanin or hemoglobin

(Muttkowski, 1921). Carbon dioxide may also have some relation to these proteins, analogous to vertebrate blood.

Iron, copper, sodium, potassium, calcium, and magnesium were found in ashed plasma. These substances, except perhaps copper, form the chlorides, sulphates, nitrates, phosphates, and carbonates, the last primarily with calcium, the others varying. (Oenslager and Mayer, 1897, report iron, sodium, and potassium.) Ammonium is also present, as indicated by the formation of triple phosphate (ammonium magnesium phosphate). During feeding periods nitrites are present in abundance, after starving only nitrates.

Among organic substances, A. G. Mayer (1897) reports albumin, globulin, and fibrinogen, Cuénot (1897) hemoxanthin and fibrinogen. The latter is probably accompanied by thrombin, although its presence was not demonstrated in the material available. The plasma also contains gelatin, a nucleoprotein, and, at feeding, various hydrolyzed proteins. Respiratory proteins, namely, hemoglobin or hemocyanin, should also be noted, the latter assumed on the presence of copper. Fat droplets are always present (Kolbe, Graber, Berlese, etc.), particularly during feeding periods (Berlese, 1901). Sugar is probably present, perhaps as a glucose, but the results of my experiments were confusing.

Waste products are the carbonates primarily, formed with carbon dioxide. Urates, xanthine, and purine may be present, but have not been definitely determined, although I found them in the Malpighian tubules.

Pigments of various types are usually found, including the carotinoids, uric acid compounds, and respiratory pigments. Cuénot (1897) reports uranidine in Meloë, which oxidizes and precipitates on contact with the air. Previously Krukenberg (1882) attributed a melanotic function to uranidine in Echinoderms.

Of enzymes, various types are present. Tyrosinase is secreted by the leucocytes in clotting blood, and perhaps thrombokinase. Histolytic enzymes are indicated by the breaking up of various small tissue fragments floating in the plasma. Enzymes acting on foods are perhaps present, but not definitely determined.

Certain special substances should be noted, such as cantharidine (Cuénot, 1897), and probably other substances found in insect secretions. Loman (1887) reports iodine in the gaseous secretion of a Paussid beetle, which presupposes its presence in the blood, from which it is extracted by the glandular tissue. I have also found traces of arsenic and lead in several instances, but can not regard them as normal constituents. Both of these are cumulative poisons and it is probable that the specimens might eventually have succumbed. Still, it is possible that at least in the Coleopteron *Scobicia declivis,* which, according to Burke, Hartman, and Snyder (1922), pierces layers of lead in lead cables and may even build galleries in lead sheets, a tolerance for lead has been developed and that analyses would show the presence of lead in the blood.

Berlese holds that Arthropod blood is more akin to the lymph of higher animals. "During digestive periods the plasma surrounding the alimentary tract forms a sort of chyle, while that in the peripheral parts corresponds to the lymph." This would be true for insects if a respiratory function were denied to the blood. But elsewhere (1921) I have recorded the presence of oxygen and respiratory proteins in insect blood. In insects the blood, besides carrying food, wastes, and plastic elements, contains respiratory proteins and oxygen, and thus supplements tracheal respiration. On this basis the blood of insects is analogous to that of higher animals.

While the preceding summary offers certain qualitative results, it has the weakness of not giving quantitative estimates, which would be more conclusive in determining if insect blood is more like lymph than true blood. The difficulty in quantitative estimates lies in the small amount of material available for study. From large caterpillars—Saturniids and Sphingidae—one may obtain as much as three to four cubic centimeters, from *Dytiscus, Hydrophilus,* and *Belostoma* perhaps half a c.c. Generally, however, when specimens are to be had in abundance, they are small and yield only a drop or two, as in full-grown *Leptinotarsa* larvae. Even with blood from hundreds of specimens, after separation of the corpuscles and concentration or evaporation, the residue is minute, with substances present in infinitesimal quantities and reacting only with the most sensitive reagents. With certain modifications, I have found the texts of Chamot and Tunman of excellent use for the study of the composition of the blood.

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Perigea iole Grt.	Lakehurst, X–16, sugar, 1922, C. Rummel.
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NEWARK ENTOMOLOGICAL SOCIETY.

TAXONOMIC CHARACTERS IN MICROVELIA WESTW.

By J. R. de la Torre-Bueno, White Plains, N. Y.

Westwood, in 1834,[1] erected the new subgenus *Microvelia* for the species *pulchella* he then described from the West Indies and included in it also *Velia pygmaea* described in the preceding year by Dufour.[2] These are the simple generic characters he employed: Head small; 4th joint of antennae longest; legs nearly equal in length; anterior tarsi 2-jointed; body small; abdomen short oval, apex rounded. The specific characterization was by color only, with the length given.

Westwood's successors added but little to his structural generic characters; and specifically differentiation continued by color, with fleeting mention of an occasional structure, up to 1893, when Uhler[3] described his West Indian forms, followed later by Champion's descriptions and by Kirkaldy's earlier work from 1900 on, when more structures were given in specific descriptions. From this time on nothing new seems to have been added, except that structure was more generally employed. In 1916, Horvath[4] published his paper on the two Microvelias of Europe; and in 1921 Parshley's[5] paper on the genus came out, which work is to date the most important contribution to the interpretation of structure of apterous Microveliae. This had been preceded in 1916[6] by my own paper on the Microvelias of the Eastern United States, in which structure was used exclusively and more extensively than in any other previous descriptions.

The purpose of the present study is to appraise the characters heretofore used, both for generic and for specific differentiation; and as an end result, to put the *Microveliae* on a firm basis of pure structure.

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[1] Ann. Soc. Ent. Fr., III: 645/52.

[2] Ann. Soc. Ent. Fr., II: 114/118, 1833.

[3] Hemiptera of Grenada, P. Z. S., pp. 217 and 719.

[4] Note sur les deux Microvelias d'Europe, Ann. Mus. Nat. Hung., XIV.

[5] On the genus Microvelia Westw., Bull. Bklyn. Ent. Soc., xvi: 87/93.

[6] Veliinae of the Eastern United States, Bull. B. E. S., XI: 52/61.

I think it may be set down as axiomatic that no variable or fluctuating characteristic may be considered such firm basis for differentiation. With this criterion in mind, all variable structures will be indicated and set aside as but secondary characters at best, perhaps useful to complete a picture; and any structure peculiar to one form only of a polymorphic aggregate will be restricted to those forms only to which it applies and rejected as not sufficient in itself to completely define a species in a clean-cut way. This study, developing chronologically, shows by whom and when new structures were considered generically and specifically; and then sifts these characters through the twin sieves of stability and universality. If what then remains is insufficient for definition, then intensive study of the group must follow to discriminate more closely between structures and to discover new differentials.

Westwood, in his original generic (or subgeneric) characterization in 1834, considers the size of the head, length of the 4th segment of the antennae, comparative length of legs to each other, number of anterior tarsal joints, and form. Burmeister in 1835[7] adds the thickness of the antennal joints and the entirely membranous character of the hemelytra. In 1843, Amyot and Serville[8] considered also the shape and structure of the prothorax, cells of the hemelytra, and structure and armature of legs. Fieber in 1861[9] used as additional generic characters the thickening of the anterior tibiae at the end and the comparative length of femora; the comparative length and thickness of the antennal segments; the comparative length of the rostrum; the structure of the mesosternum; pilosity of body and shape of head.

Up to this point all specific characterization had been exclusively by color, and Fieber is the first to employ structure in specific diagnosis in the group. His sole character, however, was the shape of the pronotum.

Douglas and Scott in 1865[10] added no new generic characters, although they used those thus far developed. Specifically, they added apterousness and pilosity for structure, all other characters being color, following established practice. In 1879, Puton[11] em-

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[7] Handbuch II: 213 (Hydroëssa).

[8] Hist. Nat. Ins. Hém., 421.

[9] Eur. Hem., 33 and 104.

[10] British Hemiptera, 573.

[11] Synopsis, 149.

ployed generically only a few of the characters already developed, but used in addition ciliation of tibiae, unarmed femora in both sexes, and absence of ocelli. For specific differentiation he employed shape of pronotum, as Fieber; and (new) structure of hemelytra and number of cells, otherwise relying on color only, as all his predecessors of high and low degree. Saunders in 1892[12] used generically, in addition to the structures already mentioned, the size and shape of the head; size and position of the eyes; and the claws. But specifically, color was king, so to speak, because he mentions only vestiture; and size and form of pronotum, already used by Fieber, from whom he doubtless derived them. Uhler began his descriptions of West Indian Microveliae in 1893 (*op. c.*), and partly broke the tradition of color. He was the first to employ specifically (he made no generic analysis) the median line of the head; the comparative size and structure of the antennae, rostrum and head; the hemelytra, the legs, to which he added in 1895[13] the surface sculpture of the pronotum and the comparative length and breadth of the bug; and the general shape of the insect. Although but these few structures were used specifically, Uhler's descriptions are quite lengthy because of the detailed color distinctions carefully enumerated. Champion followed Uhler in 1898,[14] and while he gave nothing new generically, he added much to the characters employed specifically. In addition to those in use, he gave the thickness and hairs on the tibiae, teeth on male femora, ciliation on the margin of hemelytra, and the genital and ventral abdominal segments. About this time Kirkaldy came into view. In 1900,[15] Kirkaldy described his first *Microvelia,* and for the first time are mentioned the little setate on the head; and one other structure was employed—the genitalia; all else was color. In 1902[16] he mentioned another character, in a brief two-line diagnosis—the pronotal carina. Distant now enters in 1904[17] with a generic diagnosis; he employs two new characters—the curvature of the femora and the structure of the connexivum. Specifically, he is a pure colorist.

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[12] Hem. Het. of the Br. Ids., pp. 148, 150.

[13] Hem. Colo., 61.

[14] Biol. Centrali Americana, Heteroptera, II: 127/130.

[15] Ann. Soc. Ent. Belg. XLIV: 431/435.

[16] The Entomologist, p. 281.

[17] Fauna Br. Ind., Rhynch. II: 171 and 174.

Thus far only the size and form of the prothorax had been used; but in 1916 Horvath (*op. c.*) made a brief analysis of the notal sclerites in the two apterous *Microveliae* of Europe, as characters for specific differentiation, although nothing new was added otherwise. In that same year I described several new North American *Microveliae* (*op. c.*) and used in characterizing species the length of the antennae as compared to the thorax; the facies, and the number and shape of the visible abdominal segments; and in one species, vestigial wings. Finally, Parshley in 1921 (*op. c.*), in an extended study of the apterous *Microveliae,* carefully diagnosed and elucidated the nota. This is thus far the most thorough and painstaking piece of work on the taxonomy of the genus.

In recapitulation of what precedes, the generic characters used up to this point to differentiate *Microvelia* are:

Westwood—Size of head; 4th antennal segment longest; legs nearly equal in length; anterior tarsi 2-jointed.

Burmeister—Thickness of antennae; hemelytra entirely membranous.

Amyot and Serville—Shape and structure of thorax; cells of hemelytra; structure and armature of legs.

Fieber—Distal thickening of anterior tibiae; comparative length of femora *inter se;* comparative length and thickness of antennal segments; comparative length of rostrum; structure of mesosternum; pilosity; shape of head.

Puton—Ciliation of tibiae; unarmed femora in the sexes; absence of ocelli.

Saunders—Shape of head; size and position of legs; claws.

Distant—Curvature of femora; structure of connexivum.

Of these structures enumerated, certain must be eliminated, since they are specific by nature. These are: the actual form; actual and comparative thickness of the antennae; shape and structure of the thorax; cells of the hemelytra; distal thickening of anterior tibiae; length of legs; structure of mesosternum; ciliation of tibiae; curvature and armature of femora; and structure of connexivum. The remaining valid generic characters heretofore in use are: the size and general shape of the head; long 4th antennal segment; position and structure of the legs; number of tarsal joints; entirely membranous character of the hemelytra, with few cells; absence of ocelli; and comparative length of rostrum.

In the specific characterization the following diagnostic structures have been used:

Fieber—Shape of pronotum.

Douglas and Scott—Apterousness; pilosity.

Puton—Structure of hemelytra; number of cells of same.

Uhler—Median line of head; comparative size and structure of head, antennae and rostrum; surface sculpture of pronotum; comparative length and width; general shape of bug.

Champion—Thickness of and hairs on tibiae; teeth on male femora; ciliation of margin of hemelytra; genitalia and ventral abdominal segments; pronotal carina.

Kirkaldy—Setae of head.

Bueno—Length of antennae compared to thorax; number and shape of visible abdominal segments; vestigial wings.

Horvath and Parshley—Notal sclerites in apterous form.

Of these characters, certain apply only to one or the other of the dimorphic forms—for example, the shape and size of the pronotum, the notal sclerites, presence or absence of wings, vestigial wings—all variable quantities within the species. The characters of vestiture, surface sculpturing, genitalia, head setae, pronotal carina, rostrum, comparative length of antennae to other body segments and of the joints as between themselves, and their structure; number and shape of visible abdominal segments; general form of the species and its comparative length and breadth are applicable to both forms. To these may be added from the characters rejected for generic purposes, setae on legs, claws, structure and comparative length of legs, and structure of connexivum.

Microvelia being dimorphic in general, and possibly polymorphic in certain species, has two other sets of characters which may be used most effectively, namely, the notal sclerites and vestigial wings in the apterous; and the shape, size, and structure of the pronotum and of the hemelytra in the winged. In this genus, for key purposes, only the structures common to all forms may be used with safety in differential diagnoses, and full reliance should be placed on these alone. The characters peculiar to one form only should be rejected for such a purpose, such as the thoracic structure, or the character of the wings. The stable characters common to all forms are the head and its appendages, the legs, and the genitalia. These are independent of the presence or absence of wings, with the consequent presence or absence of wing muscles to affect the form of the thorax and of the abdomen in some manner and to some degree.

But these two forms, the winged and the wingless, are very well to be characterized by the structures peculiar to each, which serve to emphasize and support the division based on the primary stable characters, characters which must appear in all descriptions of any form of a *Microvelia.*

In brief, no specific description of a *Microvelia* is convincing unless based on non-plastic, invariable characters common to all forms. Without these fixed characters, such a description is no more than a delusion and a snare. Color may help, but unless correlated to structure and ruled by it, it is neither stable nor final. The firm foundation of all specific characterizations is fixed and unvarying structures, and particularly so in the genus *Microvelia.*

A NEW GENUS OF PHORIDAE (DIPTERA).

By J. R. Malloch, Washington, D. C.

Rhyncophoromyia n. g.

Similar to *Aphiochaeta,* differing in having the frons projecting beyond anterior level of eyes and partly covering the antennae, its anterior outline rounded, the impressed central line distinct, and the postantennal bristles widely separated and proclinate. The face is produced in the form of a blunt process between antennae, the process equalling in size the third antennal segment, and the proboscis is heavily chitinized and longer than the head, as in some species of *Dohrniphora.* Otherwise as *Aphiochaeta.*

Genotype, the following species.

Rhyncophoromyia trivittata sp. n.

Female.—Yellowish testaceous, shining. Thoracic dorsum with three broad brown vittae, the central one extending over scutellum and metanotum, the others on lateral margins; a brown spot below and behind wing base. Dorsum of abdomen mostly shining dark brown. *Legs* brownish yellow. *Wings* yellowish, with a spot over fork of third vein and in base of cell beyond it, and the apex of wing brown. *Halteres* fuscous. *Frons* as long as wide, with microscopic setulae, preocellar series of four bristles nearly straight, inner bristle of anterior series in line between outer one and postantennal; antennae small, arista pubescent, dorsal; palpi elongate, with a few bristles. *Thorax* with one pair of prescutellar dorsocentrals; *scutellum* with two long bristles, *mesopleura* with some setulae, and one long bristle on its upper posterior angle. *Abdomen* tapered, not well preserved in type but evidently with a chitinized ovipositor. *Hind tibia* with about 7 posterodorsal setulae. Costa about four sevenths of the wing length, first section fully as long as next two combined, third one fourth as long as second; costal fringe close, the setulae a little longer than diameter of costal vein. Length, 1.5 mm.

Type, Higuito, San Mateo, Costa Rica (P. Schild), in U. S. National Museum.

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EDITORIAL.

On Synopses and Keys.

As one reads the various synopses and keys for groups of insects, at times one is struck with their inadequacy; at others, with their profundity; or again, with the difficulty of fixing groups or species by them because of the subtleness or vagueness of the characters used. And by this it is not meant that the dichotomies are overly difficult to use, but that for differential purposes they rely on fluctuating, internal or inadequately defined characters; at times on characters liable to become obscured by vestiture or age, or even not to be derived from the structure of the cabinet specimen, but from the use or function of a structure in nature. We cite no examples, since every entomologist working on any group whatsoever can easily supply them from memory, of each and every sort.

This difficulty arises without doubt from lack of lucidity in form, or perhaps from failure to realize the fact that all tabular arrangements naturally fall into two categories. Such tables are for one of two purposes: either to show relationship or to separate forms.

In the first case, any and every character, internal or external, constant or fluctuating, evident or subtle, may be, and should be, used for the purpose of grouping similars together, thus exhibiting their connection with each other. An example of such a table is Reuter's for the families of the Heteroptera, arranged according to his system. In such a table groups and species (if for such) follow each other in a natural sequence.

On the other hand, tables to reveal and make evident differences are essential to the quick separation of groups and species and to know them beyond doubt. Such keys are essentially practical tools for practical men, and consequently no field for a display of erudition or for the establishment of a new classification; albeit, they may on occasion serve both purposes, the one incidental to the other and principal object. A true key is no place for obscure, evanescent, subtle, or internal characters. It must be restricted to such characters as are plainly visible externally, and which do not depend on a " more or less " qualification nor on injuring or destroying a specimen to find them. Such a dichotomy will not necessarily place groups or species in linear arrangement or in sequence, but it will separate them with certainty. How often, in Hemiptera, we come across the expression " wing with a hamus "? It is not possible to open the tegmina of dry Heteroptera without injury to the specimen; and in such cases it is not possible to determine the proper place of a given specimen. It then becomes a matter of guesswork, how accurate depends on the skill and prior knowledge of the determiner. Keys such as those which practically call for dissection of specimens before they may be known are a detriment rather than a help.

It becomes necessary for makers of dichotomies or synopses to distinguish sharply between the purposes for which they are to be used, and to construct them for that one end only. If well cast, such keys at times may serve both purposes: to show similarity—and therefore relationship—as well as differences leading to exact differentiation of groups and forms.—J. R. T.-B.

BOOK NOTE.

A Naturalist in the Great Lakes Region, by Elliott R. Downing, University of Chicago (University of Chicago Press, limp leather, $3.50).

One conspicuous void in the literature of natural history in this country is the absence of those excellent books so well produced in Europe, particularly in France and England. In these two countries such works are popular yet scientific. They do not sacrifice accuracy to literature nor facts to imagination; neither are they so simple as to become silly. To write on science within the comprehension of the educated, in simple yet good form, is a distinct achievement. This Dr. Downing has succeeded in accomplishing. I know of no other American book of its kind so informing, so excellent in matter and form, and such pleasant reading. Be it understood that this is no book for the school of anthropomorphic naturalists, who interpret nature in terms of human kind, and who endow plants and animals with human attributes. There are no " heart throbs " or " human interest " here—nothing but the unfolding of the vast drama of the law-bound workings of nature, silent, inexorable, astounding. In this work the whole mosaic of the earth shows as a composite picture in all its parts, each fragment set in relation to its neighbors. It interprets nature to us as dependent parts thereof, and shows how the interplay of natural forces governs man in all his activities.

His opening chapter, "The Changing Face of Nature," brings out emphatically what has so frequently been said in this BULLETIN. Not alone does nature change by its very laws, but also by the ruthlessness of man who rives its face and upsets the delicate balance adjusted in ages past. Dr. Downing then sets forth the development of the geology of the Chicago region as a part of the American Continent, together with the characteristic physical features of the area. The sixth chapter discusses "Distribution and Adjustment" in relation to natural features and climate. The succeeding chapters, eight in number, deal with the habitats and the adjustment to them of plants and animals. A brief appendix gives a helpful outline of some of the important plant and animal associations.

The book is copiously illustrated. As a whole, the figures are very good. There are one or two which in another edition may safely be omitted, as they depict nothing known on the earth, in the heavens above, nor in the waters beneath. The index is good, but not always lucid, nor is the same plan followed for all entries.

As a book, it is very pleasant to hold in the hand. The type is good and the arrangement of the plates excellent. Typographically, there is here and there a minor error which another edition will doubtless see eliminated. This work is well worth having, for it gives the entomologist a perspective on his own subject which not all of us have the opportunity to work out ourselves.—J. R. T.-B.

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OF THE

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J. R. de la TORRE-BUENO,
Editor
DR. J. BEQUAERT GEO. P. ENGELHARDT

Published by the Society

Price, 35 cents Subscription, $1.50 per year

Mailed December 11, 1923

Entered as second-class matter January 21, 1919, at the postoffice at Lancaster, Pa.,
under the Act of March 3, 1879

The Brooklyn Entomological Society

Meetings are held on the second Thursday after the first Tuesday of each month from October to June, inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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CONTENTS

A SALDID GENUS NEW TO THE U. S. AND A N. SP., Bueno. 149
CALPODES ETHLIUS, Bell 154
NOTE ON OGDOCONTA CINEREOLA, Chittenden 155
NEW HOST FOR MEMBRACIDAE, Funkhouser 156
RANGE OVERLAPPING OF ANOPHELES MACULIPENNIS AND A. 4-MACULATUS, Freeborn 157
CALIFORNIA BUTTERFLY NOTES—I, Coolidge 159
ON THE ABUNDANCE OF TROPICAL TERRESTRIAL ARTHROPODS, Stoner 162
DISTRIBUTIONAL NOTES ON HEMIPTERA—I, Olsen 163
POLYGONIA PROGNE ON L. I., Bell 164
ANTS INTRODUCED INTO N. Y. AND N. J. AND A CORRECTION, Bequaert 165
TWO COMPREHENSIVE NEW WORKS ON THE HEMIPTERA, Parshley 166
EDITORIALS (J. R. T.-B.) 170
NEOPASITES AND POLYERGUS AT WHITE PLAINS, N. Y., Bequaert 171
PROCEEDINGS OF THE SOCIETY 172
EXCHANGES 176

Bulletin of the Brooklyn Entomological Society

Published in

February, April, June, October and December of each year

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BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XVIII December, 1923 No. 5

A SALDID GENUS NEW TO THE UNITED STATES AND A NEW SPECIES, WITH NOTES ON OTHER WATER BUGS FROM THE ADIRONDACKS.

By J. R. de la Torre-Bueno, White Plains, N. Y.

The northern mountain region of the State of New York is distinctly boreal in fauna, with affinities to the Palaearctic forms, and, at times, even identity of species, as, for example, the Pentatomid *Sciocoris microphthalmus,* a distinctly European species, reported from Mt. Marcy.

In the few species represented in this small collection made in the Adirondacks by Mr. Howard Notman (to whose kindness I am indebted for these interesting insects) there is the usual series of widespread forms. These include *Notonecta variabilis* Fieb., *N. undulata* Say, *N. insulata* Kirby, *Microvelia americana* Uhler, the abundant and country-wide *Acanthia interstitialis* Say, the common black *A. major* Prov., the rarer *A. separata* Uhler and *A. reperta,* the ubiquitous *Micracanthia humilis* Say, and the infrequent *Lampracanthia coriacea* Uhler. Most interesting of all are the three specimens of *Chartoscirta cursitans,* the new species here described.

There are also six species of Corixidae, unfortunately unnamed as yet, since this group continues in an unsatisfactory condition in spite of the work of Abbott and of Hungerford. There are no adequate tables except for a few of the species; and the characters employed are not always clean-cut and absolute. Abbott's opinion expressed personally was that the group is still in a plastic, formative condition; and that congeries of forms show considerable fluctuation around some one species as a mean, from which they differ perhaps varietally, although as between each one of the radiating forms the differences assume specific proportions. Be this as it may, as yet it is not possible either to name our forms with certainty or to say how many valid species we have in the East; nor to control them adequately and distinguish the old from the undescribed.

Here follow the actual records:

Notonecta variabilis Fieb., Tivoli, Dutchess Co., 17 May, '21; Black R., Lowville, Lewis Co., June 26, '21. Reported from northern New York by Drake.

N. undulata Say, Tivoli, May 26, '21; Keene Valley, Essex Co., May 30, '20; Mt. Marcy, Essex Co., July 25 and 27, '17. This species has already been reported by Van Duzee and Drake from this region.

N. insulata Kirby, Mt. Marcy, July 27, '17. These three species are widespread and reported throughout the northern part of the country.

Acanthia major Prov., Wallface Mt., Essex Co., July 9, '22. Five specimens of this not rare form already reported by Van Duzee and Drake.

A. interstitialis Say, Canisteo, Steuben Co., June 3–8, '22; Lake Tear, Mt. Marcy, Essex Co., July 27, '22; Oakfield, Genesee Co., June 21 and 26, '22; Indian Pass, Essex Co., July 10, '22; Wallface Mt., July 13, '22. There are numerous specimens of this widespread and common variable species which, because of misidentifications, has labored under various names. Van Duzee has already reported it under the name *pallipes* Fabr., and so has Drake in a recent paper, as well as under its own proper name.

A. separata Uhler, Lake Tear, July 27, '22; Oakfield, June 26, '22; Wallface Mt., July 9 and 10, '22; Indian Pass, July 10, '22.

A. reperta Uhler, Wallface, July 13, '22.

Micracanthia humilis Say, Lake Tear, July 27, '22; Nichols, Tioga Co., May 5, '22; Canisteo, June 3 and 8, '22; Wallface Mt., July 9 and 11, '22. This active and pretty little species is most widespread throughout the Atlantic seaboard, these present records notably extending its published distribution in the State.

Lampracanthia coriacea Uhler, Wallface Mt., July 9 and 11, '22; Ft. Hunter, Montgomery Co., May 31, '21; Oakfield, June 26, '22.

This species is worthy of notice, since it has been put by Reuter in his genus above, together with *L. crassicornis* Uhler, which is the type. It does not appear to belong here, for reasons to be set forth at length in a revision of the family at present in progress. Among the differential characteristics are the size, facies, head structure, character of hemielytra and antennae, and others. In my present understanding, this species is the macropterous form of *anthracina* Uhler, over which the name has priority. All the differential structural characters given in the description of *anthracina* arise from its brachyptery. This instance is also pertinent to my remarks on fixed structural characters (this BULLETIN, xviii: pp. 138–143).

Chartoscirta (Chartolampra) cursitans n. sp.

Head: In natural position, as seen from above, ½ wider than long, two long wedge-shaped yellow glabrous calli narrowing anteriorly, next the eyes and beginning on a line drawn behind and tangent to the ocelli; back of head scabrous; a deep vertical sulcus anteriorly, not extending beyond the eyes, set in an oval trough, the sloping sides of which are transversely rugulose; the front with a transverse strongly sinuate carina callused laterally, starting at the eyes. *Eyes* converging anteriorly, as long as their farthest distance apart; *ocelli* subcontiguous, on a line with the glabrous wedge; *antennae* longer than the length of the head, thorax and scutellum taken together, segment I stoutest, shortest, slightly curved, set with a few fine spines or coarse bristles; II nearly as long as III and IV taken together, slender, setose; III and IV subequal, slightly stouter than II, IV subfusiform and slightly stouter than III; formula: $\frac{\text{I}}{10}, \frac{\text{II}}{45}, \frac{\text{III}}{25}, \frac{\text{IV}}{23}$; a pronounced tubercle anterior to the insertion of the antennae. *Rostrum* going beyond the middle coxae (the extremity concealed by the mounting, which obscures the joints), of the typical structure; clypeus pointed, slightly longer than wide. *Prothorax* about twice as wide posteriorly as long at the median line, anteriorly ⅕ wider than long, deeply excavate posteriorly; callus well-marked, with a deep central round fovea, with rugulae radiating irregularly therefrom; flattened part behind the callus irregularly transversely rugulose. *Scutellum* slightly longer than broad, the transverse impression slightly nearer the base than the apex, the part anterior to the impression more or less shagreened and the posterior coarsely transversely rugulose. *Sternum* too much obscured by mounting for description.

Hemielytra dull with short gray hairs; veins obsolete, except the claval suture and the main corial vein, the others represented by thickenings of the corium; membrane with four cells, the apex of the first set about ⅓ above the apex of the second, the two middle cells narrow, the fourth cell widest; corial margin widest on a line drawn through the posterior end of the commissure, explanate and slightly recurved anteriorly, wider than the thorax and with a narrow reflexed edge; commissure ¾ the length of the scutellum. General color piceous to black with a few white or yellow spots; membrane yellowish with darker cloudings.

Legs: All three pairs long and evidently adapted for rapid movement; anterior femora but slightly thicker than the others, about twice as stout as tibiae, which are slightly enlarged apically; tibia subequal to femur; coxa ⅖ as long as tibia; 2d and 3d tarsal segments subequal; claws simple, moderate; tibiae set with stout bristles and spines. Middle femora of same proportional stoutness, slightly longer than tibiae (60: 55); tarsal segments 2 and 3 subequal; tibia set with bristles and long scattered spines, which are quite abundant at the extremity and extend to the tarsi. Third femora of the same proportional thickness and same vestiture as others, ½ as long as tibiae (55: 110); 3d tarsal segment ¾ length of 2d (15: 20); tibial and tarsal spines as in other segments, claws similar.

Abdomen: Female, simple, the terminal rounded segment as long medially as the preceding three taken together; segments 4 to 6 of equal length throughout and subequal to each other; segment 3 medially of equal length to the others, but slightly longer at the connexivum, where it is subequal to segment 2; structure of segment one concealed by coxae; polished black with sparse gray hairs; extremity of female 7th segment oval in outline, quite recurved, ovipositor projecting beyond it and visible beyond the hemielytra from above; male genital plate narrower and longer than female, roundedly prominent, claspers and other genitalia dorsal and concealed by the hemielytra, the other segments much as in the female.

Female: Length to tip of hemielytra, 4.64 mm.
Greatest width, 2.2 mm.
Head, long, .6 mm.; wide, 1.14 mm.
Thorax, long, .66 mm.; width, anterior, .9 mm.; width, posterior, 1.4 mm.
Scutellum, long, .9 mm.; wide, 1 mm.

Male: Length, 4.15 mm.
Width, 1.75 mm.
Head, long, .6 mm.; wide, 1.1 mm.
Thorax, long, .6 mm.; width, anterior, .72 mm.; width, posterior, 1.3 mm.
Scutellum, long, .86 mm.; wide, .9 mm.

(*Note:* All longitudinal measurements are along the median line; all widths are maximum; measurements and proportions worked out under eyepiece micrometer; description drawn up under binocular, × 10 eyepiece × 40 objective.)

The color is an ordinary dark and light pattern on the hemielytra, which might be called characteristically saldid. Head black, but the frontal calli at times are yellow; thorax black; scutellum black, legs parti-colored, lighter basally at joints. This does not purport to be a meticulous color description, which might fit one specimen, but no other in a series. Those familiar with saldids will have no difficulty in forming an idea of this; others must pin their faith to the structural details.

Type: Female, Lake Tear, Mt. Marcy, Essex Co., N. Y., July 27, 1922. *Paratypes:* 2 males, same data. Collected by Mr. John D. Sherman, Jr.; in collection of the author.

This species runs to sec. *ii* of Stål's key in *Synopsis Saldarum Sueciae* (Öfv. Kong. Vet. Ak. Forh., 1868, no. 6, p. 393), but its greater length indicates its difference. In Reuter's *Species palaearcticae generis Acanthia Fabr., Latr.* (Act. Soc. Scien. Fenn., XXI, no. 2, pp. 5 and 52), it runs to *Chartoscirta,* but differs from that genus in not being much narrowed anteriorly; in the callus extending much behind the middle of the pronotum; and in the secondary color-pattern. It also runs to *Chartoscirta* in Reuter's key in *Zur generischen Teilung der paläarktischen und nearktischen Acanthiaden* (Öfv. Finsk. Vet.-Soc. Handl., Bd. LIV, no. 12, pp. 9–10 and 23), but does not quite agree in all characters. From the generic characterization (p. 23) it differs in the rostrum going *beyond* the middle coxae, the callus extending far backward behind the middle of the thorax, pushing the bounding sulcus likewise far back; the scutellum as broad as long; and the third posterior tarsal joint shorter than the second. It might seem to come near *Lampracanthia,* but for the differences in antennal structure—the last two joints not notably thickened—and the sericeous and dull surface of the hemielytra as against the glabrous and highly polished surface in the genus mentioned. This species may eventually be referred to a new genus, but at the moment it may be at best regarded as representing a new subgenus, which we may call *Chartolampra,* since it partakes of the characters of both genera. *Chartoscirta* (*Chartolampra*) *cursitans* here described is the type of the subgenus.

Microvelia americana Uhler, Canisteo, June 3, '22. A new locality for this not uncommon and universal species of the genus.

Here is another instance of the novelties in Hemiptera that we may confidently expect if there is the least effort made to collect them. It may seem importunate to dwell on this subject so continuously, but since there are other orders and other insects than those contained in two or three of the better-known and more collected orders, it sometimes appears opportune to draw attention to them.

And, furthermore, the activity in the preparation of the long-expected New York State List of Insects makes it imperative to secure all possible material for it.

Notes on Calpodes Ethlius Cramer. (Lepidoptera Rhopalocera.)

By E. L. Bell, Flushing, N. Y.

During the first part of August, 1923, Miss Louise Knobel, of Hope, Arkansas, kindly sent to me several pupae of this large Hesperid, which she obtained by raising the larvae collected on canna in her neighborhood.

She states that this is the first time she has found this species in her locality and inquiries among her neighbors failed to obtain any other record of its former occurrence there.

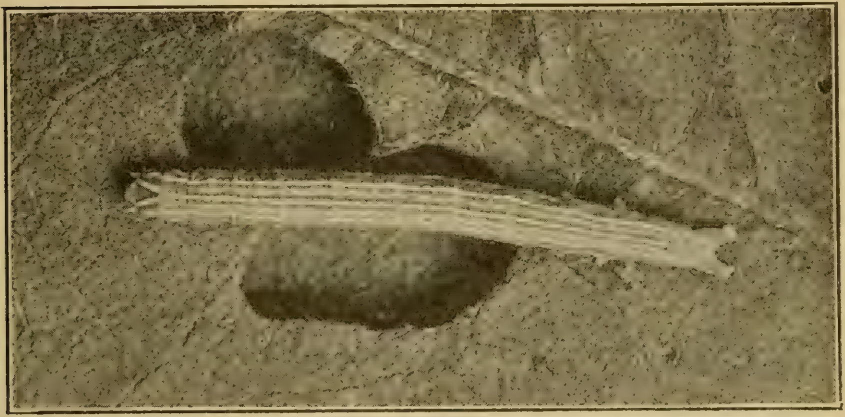
The butterflies were first observed by her in early June and have since been appearing in increasing numbers and doing considerable damage to the cannas.

Miss Knobel also says that the most larvae are found on the green-leaved plants bearing red flowers, fewer larvae on the plants bearing pink flowers or those having reddish leaves and rarely any on those bearing yellow flowers.

NOTE ON OGDOCONTA CINEREOLA GUEN.

By F. H. Chittenden, Washington, D. C.

Observations conducted by the writer in the District of Columbia on this noctuid indicate that the name of "bean cutworm" bestowed by Ashmead on the larva in 1887[1] and adopted by others, including the writer, is a misnomer. In the first place, it is not a cutworm and does not even belong to the group containing the cutworms; and in the second place, there is doubt if it ever does much injury to beans, the suspicion being that the real cause of injuries to beans which have been recorded was in reality the green clover worm (*Plathypena scabra* Fab.), the larva of which superficially resembles this insect, and a species which occasionally does serious injury to leguminous crops, as in the year 1919.



Larva of *Ogdoconta cinereola* resting on leaf of *Helianthus tuberosus*—3 times natural size.

July 4–7, 1916, the larva was observed in the District of Columbia working on the lower surface of Jerusalem artichoke (*Helianthus tuberosus*) and on sunflower (*H. annuus*). Larvae rest habitually during the day stretched out on the midribs (Fig. 1), and when the plants are in shade they feed freely and "rag" the foliage badly. Unfortunately, for photographic purposes, the presence of this larva is often complicated by that of loopers and woolly bears, so that it has been impossible to secure a characteristic illustration of its work.

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[1] Ashmead, W. H.—Bul. 14, Div. Ent., U. S. D. A., p. 21.

Larvae under observation became full grown July 7 and two days later had all disappeared, pupae being found a few days later. This species forms regular cocoons and at least two or three days elapse before the pupal condition is reached. The pupal period is about 10 days in an average temperature of 83° F.; minimum 78° F., maximum 87° F.

A general account of this noctuid was published by the writer in 1902,[2] in which it was stated that the species is probably not limited to beans among cultivated plants for food. It has been recorded as breeding on ragweed, cocklebur, and sunflower.

From moths which developed in the field during the third week of July, a second generation would develop a month later. Owing to the rather thorough collecting of the larvae where they were available for the purpose of rearing parasites, few were left for a second generation. Possibly there is at least a third generation in nature. Since 1916 the larva has not been observed, although frequent search has been made for it on sunflower and artichoke.

A single parasitic enemy may be recorded, a sarcophagid, *Cuphocera ruficauda* Wied., which issued July 20 and was identified by Mr. W. R. Walton.

This species might be known as the striped artichoke caterpillar, since, as above pointed out, the term "bean cutworm" is not applicable.

New Host for Membracidae.—In the river valleys of Kentucky there are abundant rank growths of hemp, probably escapes from cultivation. These bottomland patches have been found to be the best collecting ground in the State for various species of the genus *Ceresa,* particularly *C. bubalus* Fabr., *C. taurina* Fitch, and *C. diceros* Say. Curiously enough these membracids are seldom found in the cultivated fields of the same plant.—W. D. FUNKHOUSER, Lexington, Ky.

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[2] Bul. 33, n. s., Div. Entom., pp. 98–100.

THE RANGE OVERLAPPING OF ANOPHELES MACULIPENNIS MEIG. AND ANOPHELES QUADRIMACULATUS SAY.

By Stanley B. Freeborn, California Agric. Exper. Station, Berkeley, Calif.

On October 8 the writer, while collecting at Leverett, Massachusetts, a town about 10 miles north of Amherst, took two swarms of male anophelines near the shores of Leverett Pond. One swarm was dancing over a small pine tree and the other was in an open space on the shores of the pond about seventy-five yards from the first swarm. Both swarms were received in the same killing bottle, as they were supposed to be the ordinary 4-spotted eastern anopheline, *Anopheles quadrimaculatus* Say. Later examination, however, showed that some of the forms had the bronzy patch at the apex of the wing fringe and the study of the terminalia confirmed the fact that these forms were the holarctic species, *Anopheles maculipennis* Meigen, which has not been reported hitherto from any point on the Atlantic Coast farther south than Weld, Franklin County, Maine (H. G. Dyar, July 25, 1910).

It is of particular interest to find these two very closely allied species overlapping in range and yet maintaining their specific characters in a decidedly distinct manner. As a matter of fact, the bronzy patch of *maculipennis* is far more distinct in these specimens than it is in some California specimens, where it is so indistinct that terminalian characters must be studied to separate it from *quadrimaculatus,* although the latter has never been taken on the Pacific Coast.

The relation of these two important malaria-bearing species has been so confused that few entomologists except the culicidologists have followed their vagaries and a few words concerning their position may not be amiss. For a long time Say's *quadrimaculatus* was considered synonymous with Meigen's European *maculipennis* following the lead of Loew. Many American authors maintained the specificity of *quadrimaculatus,* however, until Theobald in 1901 again combined the two forms under *maculipennis,* which was followed until 1906, when Dyar and Knab again separated the two. In the same year Dyar founded a new species, *occidentalis,* for the Pacific Coast and Canadian form, which differs from *quadrimaculatus* by having a bronzy patch on the apical wing fringe and sharp setae on the claspette lobes of the male terminalia, while the wing fringe of *quadrimaculatus* is uniform and the setae of the claspette lobe blunt. In the monograph, Howard, Dyar, and Knab added confusion to the synonymy by suggesting that inasmuch as Say's locality for his *quadrimaculatus* was " Northwest Territory," this name should apply to the western form (Dyar's *occidentalis*), and that the eastern form previously known as *quadrimaculatus* would revert to *guttulatus* Harris. Fortunately, before this change became popularized it was pointed out that Say's " Northwest Territory " was that of 1787, including the area south of the Great Lakes and what is now Minnesota and Wisconsin, and that the expedition on which Say obtained his type penetrated no farther west than the present site of Pembina, N. D. This left *occidentalis* as the Canadian and Pacific Slope representative and *quadrimaculatus* as the form found in the central part of the United States and along the Atlantic seaboard. However, in 1921, Mr. F. W. Edwards tentatively pointed out that *occidentalis* Dyar and *quadrimaculatus* Meig. were synonymous pending the agreement of the egg stage. The writer was able to supply Mr. Edwards with a description of this stage by means of which he verified his decision, which was concurred in by Dr. H. G. Dyar, whom the writer supplied with eggs.

The result of this long discussion is that *Anopheles quadrimaculatus* is the nearctic species extending throughout central and eastern United States and *Anopheles maculipennis* is the holarctic species extending from northern Europe through Alaska and Canada and dipping into the United States along the Pacific Slope, at various points along the northern border, and into New England, where it overlaps with *quadrimaculatus* in Massachusetts.

The synonymy of the two species is as follows:

Anopheles quadrimaculatus Say.
- *Anopheles quadrimaculatus* Say (1834).
- *Anopheles guttulatus* Harris (1836).
- *Anopheles annulimanus* v. d. Wulp (1867).

Anopheles maculipennis Meig.
- *Anopheles maculipennis* Meig. (1818).
- *Anopheles occidentalis* Dyar (1906).
- *Anopheles lewisi* Ludlow (1920).
- *Anopheles selengensis* Ludlow (1920).

CALIFORNIA BUTTERFLY NOTES—I.

By Karl R. Coolidge, Hollywood, California.

Pieris rapae Linn.

Along the beach at Santa Barbara, in 1916, I observed a ♀ of this pest hovering about an ice plant, an odd fleshy maritime plant common along the coast of Southern California. She was fluttering ovipositingly, but a careful search of the plant failed to reveal any eggs. In 1919, however, Mr. Adrian van Rossem informed me that he had observed a *rapae* ovipositing on an ice plant at Anaheim Beach, near Los Angeles, and two days later I visited this spot and found both eggs and larvae. The ice plant (*Mesembryanthemum crystallinum* Linn.) is a member of the *Aizoaceae,* or Carpet-weed family, and constitutes a new food-plant for *rapae.*

Regarding the vernal form of *rapae, immaculata* Cockerell (also Skinner & Aaron), I believe this name to be superseded by that of *metra* Steph., Ill. Brit. Ent., Haust., I, 19–20, 147–148, 1827. Scudder, Butt. N. Eng., Vol. 2, p. 1207, 1889, calls attention to this, writing:

" Pieris rapae metra. Meyer Dür gives the following distinction between the spring and summer broods (which I believe Zeller was the first to point out forty years ago) as they appear in Switzerland. The spring specimens are dull white; above, the apex of the forewings is narrowly grayish, the bases of all the wings strongly sprinkled with black scales; the spot in the upper median interspace of the fore wings and the costal spot of the hind wings are small, generally pale grayish or even wanting; the under surface of the hind wings is dull yellow with black flecking, which, especially along the median nervure, is pretty heavy; the abdomen is clothed with long hairs."

Barnes and McDunnough (Check List) place *novangliae* Scudder as a ♀ aberration of *rapae,* though Scudder writes: " I have only seen males," though adding later on: " Females, however, are not unknown."

Strymon avalona Wright.

Described from Santa Catalina Island, some thirty miles off the coast of, and part of, Los Angeles County, California. It is quite a common butterfly on the island, the first brood emerging in late January or early February, and successive broods from then on until late fall. It is the most abundant in the hot fall months, August and September. In early August, 1919, Mr. H. H. Newcomb and the writer found the species very common on the hot, dry hillsides a mile or so from Avalon, the principal town of the island. The butterflies were feeding on *Eriogonum giganteum*, which is confined to Catalina and the other channel islands, and concluding that this was the food-plant, I confined nine females with some sprigs of it and brought them to Los Angeles. Two days later all were dead, only one having placed a single egg on the bottom of the jar, and this was injured in removing it.

In February, 1921, Mr. Adrian van Rossem observed a ♀ *avalona* ovipositing on the under surface of the leaves of *Syrmatium ornithopium* Greene, a plant of the *Fabaceae* family, but unfortunately misplaced the eggs so obtained. *S. ornithopium* is mainly an insular plant, occurring on Santa Catalina, Santa Barbara, San Nicolas, San Clemente, and Guadalupe Islands, and on the mainland of Lower California. From the single egg obtained in 1919 the following description was made: *Egg Strymon avalona.*—In shape a depressed echinoid, the base and top sharply flattened. Ornamented with a low raised net work, pure white, the cell walls about .001 mm. in thickness. On the sides of the egg this net work divides itself into mostly sub-triangular cells, averaging .025 mm. in length; many, however, are distinctly subquadrate. On the summit the subquadrate cells predominate, and some are five sided. At the angles formed by these cells are the usual rounded protuberances, about .015 mm. in thickness and .002 mm. in height. The micropyle in a low circular depression, with gently sloping sides, .13 mm. in diameter; the rosette composed of a group of equal suboval cells, .02 mm. in length on the average. Color bright bluish green. Height .32 mm. Diameter .58 mm.

Strymon melinus Hübner.

In addition to the various cultivated beans, I have found the following food-plants of *melinus* in California:

Malvaceae.

Malva borealis Linn.—Cheeseweed, a very common weed in California, introduced from Europe. This is the usual food-plant here, the eggs being placed on the young flower buds. Also on *M. rotundifolia* Linn., Dwarf Mallow, and *M. parviflora* Linn., Small Flowered Mallow, both importations from Europe.

Sphaeralcea ambigua Gray.—Desert Mallow. On the Colorado Desert, with the eggs on the flower buds, seed pods, rarely on the upper surfaces of the leaves.

Polygonaceae.

Polygonum lapathifolium Linn.—Common Knotweed. At Buena Vista Lake, Kern County, the egg placed on the spikes.

Labiatae.

Hyptis emoryi.—Desert Lilac. On the Colorado Desert, the eggs tucked in between the young flower buds.

Goniurus proteus Linn.

Seven or eight years ago this species appeared in considerable numbers in the bean fields about Los Angeles, but appears now to have disappeared, and I know of no captures here since 1915. I observed *proteus* at Lindsay, Tulare County, in the fall of 1910, and took several examples at Santa Paula, Ventura County, in 1914. *Proteus* is now quite common in the Imperial Valley, and in the past year or so seems to have invaded the Coachella Valley, in Riverside County, this being really only a western extension of the Imperial. I found the butterfly ovipositing on string beans about Indio and Indian Wells, and the ranchers there informed me that they had only observed the species that season. Several ♀♀ were also seen ovipositing on the under surfaces of the leaves of the mesquite or algaroba (*Prosopis glandulosa* Torr.), a small tree or shrub well known in the desert regions, belonging to the *Mimosaceae* family, and I believe this to be a new food-plant for the species.

Epargyreus exadeus Cramer.

The only specific record of this species in the United States that I can find is by Skinner (Trans. Am. Ent. Soc., p. 194, 1911), recording a fresh specimen taken in March at San Luis Obispo, Calif. Lindsey, in his recent revision of the *Hesperioidae,* also lists New Mexico and Arizona. From the collection of E. K. Harvey I have a battered example of *exadeus* labeled: " Rare skipper, ♀, June 20, 1905. Taken in my backyard, 1408 Burlington Ave., Los Angeles, Calif." Like *Calpodes ethlius* Cramer, which has on several occasions been taken about Los Angeles near beds of its food-plant, cannas, *exadeus* has no doubt been brought here on its food-plant in some immature form, and can hardly be classed as native to California.

ON THE ABUNDANCE OF TROPICAL TERRESTRIAL ARTHROPODS.

By Dayton Stoner, State University of Iowa, Iowa City, Iowa.

The relative abundance of terrestrial arthropodan life, particularly insect life, in the moist tropical regions is well known. But it was not until the occurrence of my visit to the Fiji Islands on a collecting trip last summer that the matter was forcefully brought to my attention.

Of the approximately two hundred islands in the Fiji group, Viti Levu is the largest (about 7,500 square miles in area). It lies in 18° south latitude and 178° west longitude. The topography is volcanic and rough; and rainfall is most abundant on the southeast or " wet " side of the island in the vicinity of Suva, the principal town and political capital of the group. Here the annual precipitation averages about 130 inches. In December, 1918, a rainfall of 107 inches occurred.

An overland journey of ten miles to Nausori, thence by launch up the Rewa River twenty-five miles, brings one to the native village of Viria, about which is more or less of the original bush, and to which place I went in search of insects and other arthropods. The village is occupied by approximately sixty Fijians living in a variety of houses arranged in the form of a hollow square where the grass is kept continually short by pigs, goats, and numerous bare feet.

Unfortunately for me, a drizzling rain set in the morning after my arrival and continued during the day without intermission, sometimes increasing to a steady downpour. In spite of the inclement weather I started on my quest, and when the rainfall became exceedingly copious—which it did at frequent intervals—I sought shelter under the dripping trees.

On one occasion, advantage was taken of a coconut tree in a small taro patch. Here, while undergoing a drenching only a little more slowly than if I had been totally unprotected, I turned my attention to the arthropod life on the tree trunk which was about seven inches in diameter. My observations extended over a period of only twenty-five minutes and were made on an area occupied by the circumference of the basal portion of the trunk for a vertical distance of five feet. The following arthropods were seen thereon during this time:

Pseudoscorpiones, 1 species; Araneina, several individuals of 2 species; Collembola (springtails), many individuals; Dermaptera, 1 species; Heteroptera, 1 species; Coleoptera, 1 elaterid, 1 cerambycid, and 2 or 3 other species, one of which was an inquiline; Diptera, several individuals of 3 or 4 species; Hymenoptera—of flying forms, several individuals of 2 species—of ants, many individuals of at least 2 species.

Many individuals embracing eight orders and at least seventeen species of terrestrial arthropods were seen here in this brief space of time. No doubt a more minute examination would have revealed still others. Possibly the arthropod life is more abundant in such a situation during a period of rainy weather, but its presence under even these conditions is at least suggestive of the intricate ecological complex of which it forms an interesting and important part.

DISTRIBUTIONAL NOTES ON HEMIPTERA (NO. 1).

By Chris. E. Olsen, Nyack, N. Y.

Banasa euchlora Stål.—To this strictly southern species of Pentatomidae must be recorded an added northward extension of its distribution. Mr. F. M. Schott has collected a specimen at Long Beach, L. I., N. Y., March 27, 1921, and another at Atlantic City, April 9, 1922. Both specimens were taken in wash-up at tide line. This not only extends the distribution of this species considerably northwards, but it also adds a species to both New York and New Jersey State lists of Pentatomidae, and a rare record for the Long Island List of Insects.

Podisus fretus Olsen.—This species is not common at all. It is being perhaps overlooked on account of its close resemblance to other allied species that are more or less common (*P. maculiventris* and *P. serieventris*). Another specimen has been collected by Mr. F. M. Schott at Burnsville, N. J., August 12, 1917.

Hesperotingis antennata Parshley. — Another record must be added to the list of odd captures of this species. Previously it has been known by single specimen from Fire Island, N. Y. (Bueno),* Delaware Water Gap (Slosson),* New Haven, Conn.

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* Collector.

(Olsen).* Type came from Lakehurst, N. J. (Barber).* Mr. F. M. Schott has taken a very fine specimen at Huntington, L. I., N. Y., July 10, 1921. This is the second record for Long Island.

Pithanus maerkelii (Herrick-Schaeffer).—This was first found at Long Island by the writer; later it was reported by Prof. Parshley from several places in Maine. In one of his papers appears the record of its occurring in British Columbia. I have later collected this at Woods Hole, July 15, 1918, and with Mr. J. R. de la Torre-Bueno at White Plains. Recently Mr. F. M. Schott collected a specimen from Wading River, L. I., N. Y., June 27, 1922. (Again taken at White Plains on June 24, 1923.—J. R. T.-B.)

Ceresa albescens Van Duzee.—Two specimens of this species have been taken by Mr. Harry B. Weiss at Middlesex Co., N. J., August 6, 1921, and one by Mr. Ernest Shoemaker at Alex. Co., Va., July 7, 1918. It is not often met with in record or collections, although it seems to show a wide range of distribution, being described from specimens taken at Hamburg, N. Y., Niagara Falls, Ont., and Effingham, Kans. Mr. I. Matausch reared this species from nymphs found in the vicinity of Elizabeth and Newark in 1910. These records seem to have been missed in the New Jersey list. There is a small discrepancy between the three above-mentioned specimens and the description in the length of the clypeus. All other parts fit well, and, without doubt, these specimens belong here.

Acanalonia bivittata (Say).—It is well known that among green colored insects, especially among certain grasshoppers of the family Locustidae and the leafhoppers genus *Gypona,* we find occasional pink, red, or brown colored specimens. Mr. Harry B. Weiss has taken a beautiful bright red example of the above-mentioned species at Middlesex Co., N. J., August 20, 1921. I have taken another from Ulster Park, August, 1922. Mr. Dickerson has taken several in New Jersey. Mr. Wm. T. Davis mentions that in his experience, wherever these color varieties are taken, they are apt to be found again.

Polygonia progne on Long Island.—During my collecting at Flushing, Long Island, N. Y., this summer I took two specimens of *Polygonia progne* Cramer, one in perfect condition on June 23, 1923, and a worn one on August 11.—E. L. Bell, Flushing, N. Y.

Ants Accidentally Introduced into New York and New Jersey; and a Correction.—Mr. J. R. de la Torre-Bueno has recently presented me with a number of worker-ants and cocoons which were taken in a bunch of bananas bought in New York City. Prof. W. M. Wheeler, who has kindly examined these insects, writes me: "The specimens from the bananas I take to be *Camponotus* (*Myrmothrix*) *abdominalis* (Fabricius) subsp. *ustulatus* Forel var. *mediopallidus* Forel. They are darker than specimens of this same variety from Mexico and perhaps represent a new variety, but the species is so variable and so many forms have already been described that I should place them, at least provisionally, with *mediopallidus*." This ant can not, of course, be included in the local fauna on the strength of this accidental introduction. Its capture is nevertheless interesting as illustrating once more the ease with which Formicidae are transported from their original homes. With the ever-increasing commercial relations between the tropics of various parts of the world, the possibility of certain species being carried over great distances by man should always be kept in mind by students of zoogeography.

In the list of Long Island and Staten Island ants published in this Bulletin for February, 1922, Mr. W. T. Davis and I said that *Tetramorium guineense* (Fabricius) had not yet been recorded from New Jersey. This statement is due to an oversight. In 1914, Mr. H. B. Weiss found not only this *Tetramorium*, but also two other species of exotic ants, *Pheidole anastasii* Emery and *Prenolepis fulva* Mayr subsp. *pubens* Forel, nesting in a greenhouse at Rutherford, New Jersey (Ent. News, XXVI, 1915, p. 106). The Argentine ant, *Iridomyrmex humilis* Mayr, was also met with in New Jersey on one occasion, in packing of nursery stock received from Germany (T. J. Headlee, 35th Rept. New Jersey Agric. Exp. Stat. for 1914, 1915, p. 353). There is, however, no record as yet of this *Iridomyrmex* having become established in greenhouses in this vicinity, so that it could not properly be listed among the ants of New Jersey. In the Southern States and in California it has become a very troublesome pest.—J. Bequaert, New York.

BOOK NOTES.

Two New Comprehensive Works on the Hemiptera: a Review.

By H. M. Parshley, Smith College, Northampton, Mass.

Fashions change in entomology as elsewhere and it is now quite à la mode to work on the Hemiptera, formerly the most neglected of the larger orders of insects. Not only are many of the younger students choosing Hemipterology as a life-work, but even among the Dipterists, Coleopterists, and encyclopaedists few there be who do not feel impelled to supplement their ordinary labors by dashing off in odd moments a monograph on some inviting group of the bugs. In contrast to the resulting publications, which, of course, are very uneven in quality and fragmentary in nature, the attention of the reader is called to two recently published works, the one English, the other American; both are comprehensive, authoritative, and 100 per cent. hemipterological in authorship.

1. **A Biology of the British Hemiptera-Heteroptera.** By Edward A. Butler. (H. F. and G. Witherby, London, 1923.) 682 pp., 7 plates (photographic and colored), numerous text-figures, bibliography, table of seasonal distribution, systematic list of species, and index.

This great work aims " to gather together into one book all the information that has been amassed by various observers, whether in the British Isles, on the Continent, or in America, about the early stages, the life history, and the habitats, habits, and distribution of [the] British species." Taxonomic and descriptive matter pertaining to the adult condition is included only where the author finds it desirable to supplement the treatment provided in Saunder's well-known manual, and in fact there is very little of purely systematic interest beyond a few abbreviated keys in the chapter on Miridae and an occasional enumeration of varietal forms. From the ecological standpoint, however, this book marks a great advance, since at a single step it brings the biological aspect of Hemipterology from far in the rear to a position almost abreast the systematic.

After an introduction dealing with generalities, such as relations to the Continental fauna, nymphal characteristics, wing polymorphism, food plants, etc., the body of the work is devoted to the detailed ecology of each species in the British list, in paragraphs headed: *Ova, Larvae, Life-cycle, Habitat, etc.* (a very comprehensive section!), and *Distribution.* The nymphs of a great many species are represented in simple text figures, while the eggs and some of the more striking larvae of certain species are shown on excellent photographic and colored plates. In spite of the large amount of information compiled by the author and the extensive original contributions resulting from his own experience, the word "unknown" frequently follows the paragraph heading. This is, indeed, an admission of ignorance, but such a definite statement of inadequacies will serve a very useful purpose by indicating directions in which future research is sure to be fruitful. Would that the taxonomists were always equally frank in matters of uncertainty or ignorance!

Mr. Butler's work merits nothing but praise; and it is destined to become one of the classics of the subject, since it is sound and original in plan, comprehensive in scope, and valuable, directly or by analogy, in the study of other faunas.

2. **The Hemiptera or Sucking Insects of Connecticut.** By W. E. Britton [editor], J. F. Abbott, A. C. Baker, H. G. Barber, W. T. Davis, D. M. DeLong, W. D. Funkhouser, H. H. Knight, A. C. Maxson, H. Osborn, H. M. Parshley, E. M. Patch, L. A. Stearns, J. R. de la Torre-Bueno, E. P. Van Duzee, and H. F. Wilson. Bull. 34, State Geol. and Nat. Hist. Survey; Guide to the Insects of Connecticut, Part IV. 807 pp., 20 pls., 169 text-figs.

This publication indicates a distinct stage in the development of American Hemipterology, and for two reasons. In the first place, it is the only detailed taxonomic treatise covering any considerable portion of the North American continent—it is intended to include all the species of the northeastern states—and in the second place, it recognizes the growth of specialization by making use of the varied abilities of no less than sixteen different authors! The editor has shown commendable judgment in organizing a coherent whole from very diverse materials, without sacrificing in any important respect the individuality of any of the collaborators; and the important matter of fixing responsibility is taken care of by the simple device of stating the author's name in connection with the treatment of each family.

In this Bulletin the word Hemiptera is used in its broadest sense, the Parasitica (sucking lice) being included as well as the Homoptera and Heteroptera; and since the scale insects and aphids are fully treated the volume will be valued for its economic importance as well as its taxonomic completeness.

In the introduction the editor discusses such matters as life history, economic importance, statistics, collectors, and authorship, giving under the latter heading brief statements regarding the specialists who were called upon to work up the various families. The bulletin includes treatment of 1,646 species and varieties, of which 872 are definitely recorded from Connecticut; there are 486 genera, distributed in families as follows: Parasitica, 4; Homoptera, 9; Heteroptera, 32.

Each suborder is introduced by a key to families, following which the various groups, down to species and variety, are elucidated by tables for determination and in most cases by brief descriptions and discussions of anatomy, habits, and economic importance. A large number of new figures are given to illustrate the general appearance and important structural characters of most of the families. One hundred and twenty-seven species and varieties are described as new (mostly Miridae), and throughout the work the authors have introduced a great deal of novel and original taxonomic matter.

It is impossible to consider in detail the various contributions, all of which merit the close study of the student, but I find myself unable to conclude this review without especial mention of Dr. H. H. Knight's paper on the Miridae (Capsidae). The foundations for the study of this large and difficult family were laid by Reuter, whose life-work is represented by a series of profound and, it must be confessed, often enigmatic monographs. In this country both Uhler and Heidemann made ambitious plans for work on the Mirids, but death supervened before their labors approached completion. Dr. Knight has for some years devoted youth, industry, and marked ability exclusively to this family; and now, in this contribution to the Connecticut Bulletin, he has achieved what his predecessors failed to accomplish. In spite of the sectional character of the Bulletin as a whole, the chapter on Miridae constitutes a fundamental monograph of the family, needing only a certain degree of expansion in details to cover the North American fauna completely. Original keys, brief descriptions, and numerous figures of genitalia are employed in treating the 403 species and varieties referred to (only 149 of them from Connecticut!), and a large number of forms are described as new, of which many are of common occurrence, though hitherto unstudied. If it were necessary to choose among the contributions to this volume, on the basis of originality of treatment and the filling of long-felt wants, it seems to me that first place must be awarded to Knight's work on the Miridae, with DeLong's paper on the Cicadellidae a good second. The other authors need not repine, however; this award is by no means official, and each one who reads and uses the Bulletin will form his own, and perhaps a different, opinion.

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EDITORIAL.

The Crumbs of Dives.

(Our subscribers are asked to read this attentively.)

Much has happened in the printing field since that day five years ago on which we were enwrapped in the mantle of editorship. The sufficiently uneasy position of our entomological publications has become steadily more difficult. This BULLETIN, while endeavoring to give its subscribers as much as possible, has done so in the face of steadily advancing costs, which have outstripped our growing subscription list. Now, we ask our friends who have demonstrated their liking for our publication in so many and so excellent ways once more to cooperate with us—as they so generously did last year—in enlarging our subscription list. If *you* who read this will get us *one* more subscriber, it will be just that much help in maintaining the standard we ever endeavor to reach. So much for the personal part—or the selfish part.

The general fact is that such forms of science as ours—highly technical, seemingly unremunerative, quite inconspicuous—are overlooked by those generous and public-spirited citizens who are the mainstay of art and of the more picturesque and potentially more remunerative forms of science.

All the world is struck with the great advances in preventive medicine, but few realize to what extent they are builded on the solid foundations of life-histories and habits of insects, foundations laid by unobtrusive and unknown entomologists. It is entomologists who have paved the way for the sanitation of the tropics, for the abolition of malaria, and of the many other diseases whose causative organisms depend upon insects for transmission. But it is the medical profession and its great research institutions which seem to reap all the support. It is they who enjoy the millions for scientific work.

We speak under correction, but it seems to us that a few crumbs from the overflowing table of Dives would not be missed. But they certainly would help nourish our journals suffering from malnutrition, beri-beri, and similar ills of lack of nourishment. Just so little as $\frac{1}{10}$ of 1 per cent. of $5,000,000, say, would help wonderfully to set up any of our entomological journals for the next five years.

These thoughts are commended particularly to such of our readers as can use them to good purpose, and to all others as a subject of meditation.

(N. B. Contributions for scientific purposes are exempt from income taxes.)

Charges for Reprints.

Our charges for reprints again change. Printing costs continue to advance, and have gone up nearly 100 per cent., and while we will not discontinue our established practice of giving authors 25 separates, these hereafter will be in loose sheets, without change as printed. Authors who desire the reprint form such as we have given heretofore, we regret to have to say it, we must charge a higher rate. Such reprints will not be printed in lots less than 100. In the February number we will give the new rates for such special reprints. We announce this now, so that our friends will be informed of this change we are compelled to make in our policy regarding reprints. The new form goes into effect after this number.

Neopasites and Polyergus (Hym.) at White Plains, New York.—The recent capture in that locality of *Neopasites illinoiensis* Robertson deserves to be placed on record, since this small, parasitic bee has not to my knowledge been before listed from the vicinity of New York City. The specimen, a female, was obtained by Mr. J. R. de la Torre-Bueno, June 23, 1923. In the Hymenoptera of Connecticut the species is mentioned as taken at New Haven.

On July 1, 1923, Mr. Bueno and I had the good fortune of witnessing the return to the nest of a marauding column of the slave-making ant, *Polyergus lucidus* Mayr. The several workers, each carrying a pupa robbed from the nest of a *Formica,* were crossing the road on the dam of the White Plains Reservoir, at 5.30 P.M.—J. Bequaert, Boston, Mass.

PROCEEDINGS OF THE SOCIETY.

Meeting of October 26, 1922.—Mr. Engelhardt announced the death of Mr. Silas C. Wheat, Active Member of the Society. (An obituary notice was published in the Bulletin for October, 1922.)

Local Records.—Dr. Bequaert mentioned that one of the type specimens of *Pedinomma nearcticum* Brues, described in *Psyche* for February, 1922, was collected at Wyandanch, Long Island, by Mr. Davis. He also read a short note on "Dolichopodidae from the Source of the Hudson River, N. Y." (see Bulletin for December, 1922), and another on the local species of *Trachytrechus* (see Bulletin for October, 1923).

Scientific Programme.—Account of the members' summer experiences and observations.—Mr. Schaeffer recorded finding *Donacia tuberculata* Lacordaire at Maspeth, Long Island. Mr. Weeks spoke of *Vespa diabolica* attacking and eating the drones which had been dumped out of a swarm of honey bees. Mr. Bueno had found *Microvelia hinei* Drake in great numbers near White Plains, N. Y. Dr. Bequaert spoke of his trip to Europe and more particularly of his visit to the British Museum. He exhibited a specimen of *Microdon bombiformis* Townsend found on Staten Island by Mr. Davis. Mr. H. Notman described his collecting trips to various parts of New York State. At Nichols, Tioga Co., on the Susquehanna River, he obtained, May 20, *Philodes testaceus* (Leconte) and *Pericompsus ephippiatus* (Say). Mr. Engelhardt exhibited a series of twenty of the Aphis butterfly, *Feniseca tarquinius* (Fabricius), selected out of a lot of over fifty specimens to show color variation within one species. Beginning with examples nearly devoid of the black margins across the primaries and lacking the marginal spots on the secondaries, the series showed a gradual intensification to cross bars on the primaries and connected bands on the secondaries. All of the specimens were bred from alder twigs infested by the cottony alder aphis, obtained in the Brooklyn Botanic Garden, August–September. The presence of the larvae would be indicated by the ragged appearance of the aphis colonies, but no attempt was made to ascertain their number at the time of collecting. Mr. Engelhardt also showed three species of Aegeriidae collected by Mr. E. Bell at Ogdensburg, New Jersey, in July and August: *Albuna fraxini gloriosa* G. P. Engelhardt (Ampelopsis root-borer), *Memythrus sepsiformis* Hy. Edwards (Grape-vine root-borer), and *Alcathoe caudata* var. *walkeri* Neumoegen (Clematis root-borer). One is a new record for New

Jersey, another had only been recorded once, and the third is an aberration of which only a few specimens are known. Mr. Schaeffer showed a number of interesting captures made by Mr. Schott: *Aphodius haemorrhoidalis* Linnaeus, taken at Wading River, L. I., in small numbers, June 24; this is the second record of this species for the United States and the first for Long Island; it has, however, also been found by Mr. Schott at Huntington, L. I., and Lakehurst, N. J.; it is a recent importation from Europe. *Scolia nobilitata* Fabricius was found by Mr. Schott on Long Island, and on July 3, 1922, Mr. Schaeffer took it also at Yaphank, L. I. Mr. Schaeffer further exhibited *Oxycnemus nigripennis* (Leconte) and *Anchytarsus bicolor* (Melsheimer), both taken by him at Yaphank, L. I., and a specimen of *Cuterebra horripilum* Clark which he found at Wading River, L. I. Mr. Bell showed, among other of his captures, *Gnorimus maculatus* found by him on beach plum blossom at Coram, L. I. Mr. Davis read some remarks on *Polistes* wasps and their nests, to be published in the Proceedings of the Staten Island Institute of Arts and Sciences. Upon request from the chair, Mr. F. H. Benjamin discussed various difficulties of entomological nomenclature.

MEETING OF NOVEMBER 16, 1922.—**Local Records.**—Mr. W. T. Davis read a short note upon the swarming of *Lasius claviger* (Roger) as observed on Staten Island, November 7. He further mentioned that on November 2 *Polistes pallipes* Lepeletier had been found again on the same stone from which a whole month before a nest had been removed. Mr. Engelhardt showed over 100 specimens of two species of Aegeriidae, *Euhagena nebraskae* Hy. Edwards and *Paranthrene canescens* Hy. Edwards, received from Colorado through Mr. Oslar.

Long Island Records.—Mr. Doll showed *Melalopha albosigma* Fitch bred from a cocoon found at Jamaica North, Long Island. The other Long Island record for this species is a specimen taken by Mr. Engelhardt at Pennequid Barrens.

Scientific Programme.—Under the title "*Entomological Societies Here and Abroad,*" Dr. Bequaert related some of his experiences at the meetings of various entomological societies in Belgium, France, and England, comparing them with similar activities of the American societies.

Upon request from the Chair, Dr. Blatchley said that he was now on his way to South America, where he intended doing entomological work, especially in the Hemiptera. He recalled some of his experiences since he started his entomological career, 37 years ago. He had successfully devoted himself to the study of Coleoptera and Orthoptera and was at present working at a Manual of the Heteroptera of the Eastern United States.

Meeting of December 14, 1922.—This was devoted to the Semi-Centennial Celebration of the Society. Dr. C. P. Alexander, of the Massachusetts Agricultural College at Amherst, Mass., was elected a member of the Society.

Dr. L. O. Howard, Prof. Comstock, and Rev. C. J. S. Bethune were elected Honorary Members of the Society, and Mr. C. W. Leng was elected Honorary President.

Scientific Programme.—Mr. C. W. Leng delivered a delightful lecture entitled "*Memories of Fifty Years Ago,*" which was greatly enjoyed by all present. (See Bulletin for February, 1923.)

Annual Meeting, January 11, 1923.—The following officers were elected to serve during the year 1923: President, Mr. Wm. T. Davis; Vice-President, Mr. J. R. de la Torre-Bueno; Corresponding Secretary, Mr. Howard Notman; Recording Secretary, Dr. J. Bequaert; Treasurer, Mr. G. P. Engelhardt; Curator, Mr. G. Franck. The election of a Librarian was postponed till the next meeting. The Publication Committee was elected to consist of Mr. J. R. de la Torre-Bueno, Editor; Mr. G. P. Engelhardt; and Dr. J. Bequaert. Mr. Notman was appointed Delegate to the Council of the New York Academy of Sciences.

Local Records.—Dr. Bequaert showed an ant, *Camponotus abdominalis* subsp. *ustulatus* var. *mediopallidus* Forel, found by Mr. Bueno in a bunch of bananas bought in New York City (see this Bulletin, p. 165). He also exhibited a specimen of *Muscina pascuorum* Meigen, from Ithaca, N. Y., a fly recently introduced from Europe, which in 1922 has suddenly appeared in large numbers near Boston and elsewhere in the eastern United States. Mr. Wm. T. Davis exhibited a photograph of a gall of *Cynips strobilana* Osten-Sacken on *Quercus bicolor* and a beautifully preserved specimen of the gall of *Biorhiza forticornis* Walsh on *Quercus alba.* The gall last named was collected August 24, at Buck's Hollow, Staten Island, and when dry had retained its bright scarlet color. Mr. G. P. Engelhardt showed pupae of *Callosamia carolina* Jones, from Mobile, Alabama. These pupae were attached to twigs of *Magnolia glauca* and further surrounded by the leaves of the tree, so as to be well hidden.

MEETING OF FEBRUARY 15, 1923.—The following additional officers were elected: Librarian, Mr. Elmer McDevitt; Curator, Mr. A. C. Weeks; Honorary Curator, Mr. Geo. Franck.

Mr. Engelhardt showed empty pupal cases of a locust or cicada which he found in a store in Chinatown, New York City, and which was said by the storekeeper to be "good medicine." Mr. Beutenmüller presented the Society with the old records of the NEW YORK ENTOMOLOGICAL CLUB in the handwriting of the late Hy. Edwards, dating from the year 1880.

Scientific Programme.—Mr. J. R. de la Torre-Bueno read a paper, "*On Specific Characters in the Genus* MICROVELIA." (See BULLETIN No. 4, pp. 138–143). Mr. H. Notman spoke of "*A Parasitic Staphylinid Beetle from a South American Opossum*" which he had recently described in the *American Museum Novitates*. Mr. Davis mentioned several cases which had recently come to his notice and in which caterpillars appeared to show a certain amount of intelligence in hanging up their cocoons so that they could not be eaten by mice or sucked out by woodpeckers. Dr. Bequaert showed a small hymenopterous wasp of the family Bethylidae which in the Belgian Congo becomes at times troublesome by stinging people who accidentally disturb or touch them.

J. BEQUAERT,
Recording Secretary.

Notice to Members of the Society.

Subscriptions of members will be billed with dues by the Treasurer. Disregard the enclosed subscription blank.

EXCHANGES.

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

WANTED.—Pentatomidae, Cydnidae, and Scutelleridae from all parts of the United States for determination or exchange. Dayton Stoner, State University of Iowa, Iowa City, Iowa.

NEW ARRIVALS.—From Colombia, French Guiana, and Brazil. Brilliant tropical Lepidoptera for scientific and decorative purposes. H. S. Parish, 81 Robert St., Toronto, Ont., Canada.

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WANTED.—Ants from all portions of the United States for determination or exchange. Will also exchange other insects for ants. M. R. Smith, Assistant Entomologist, State Plant Board, A. and M. College, Miss.

MISSISSIPPI INSECTS.—Will collect in all orders. Correspondence solicited. Miss Sophie May Newbern, Cedar Bluff, Miss.

OFFER.—Bred adult specimen of *Catocala herodias* in exchange for ova of species of same genus. Parent moth with ovum preferred. G. J. Keller, 68 Treacy Ave., Newark, N. J.

WANTED.—Records N. Y. State Rhopalocera for check-list, all species and localities desired for a table showing the distribution throughout the State. James L. Angle, Librarian Rochester Municipal Museum.

WANTED.—Offers on bright-colored butterflies and moths for use in trays and pictures. Mrs. Robert Milde, Lewiston, Minn.

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WANTED.—Cynipidæ and their galls from all parts of the world. Exchange or cash. Western and Southern material particularly desired. Wm. Beutenmuller, Box 258, Highwood, Bergen Co., N. J.

WANTED.—Saldidæ, especially from the Western U. S. and Canada. Will name or give good exchange. J. R. de la Torre-Bueno, 11 North Broadway, White Plains, Westchester Co., N. Y.

WANTED.—Papers published since 1894 and containing references to American Coleoptera by Bernhauer, Grouvelle, Lesne, Leveille, Lewis, Pic, Otto Schwarz, Wasmann or other foreign authors. Will pay cash or give in exchange papers by American authors that I have in duplicate. C. W. Leng, No. 33 Murray St., New York City.

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